

3.7 BIOLOGICAL RESOURCES

This section addresses the potential impacts of SPR expansion on the following types of biological resources:

- Plant communities, wetlands, and wildlife;
- **Special status species** to include threatened and endangered species and their designated critical habitat;
- Migratory birds, bird nests, and eggs regulated by the Migratory Bird Treaty Act;
- EFH; and
- Protected areas including federal and state parks, forests, wildlife refuges, conservation areas, and other areas of ecological importance.

This section presents the methodology for characterizing the affected environment and analyzing the potential and common impacts associated with a new or expansion SPR site. Following the common impacts, DOE presents the affected environment and associated impacts specific to each proposed new and expansion site. This section discusses the plants, wetlands, and wildlife, the special status species, the EFH, and the special status areas associated with each proposed expansion and new site and its associated infrastructure. Each site section is organized by major SPR facility component—namely storage site and associated facilities, pipeline, access road, and power line ROWs, RWI structure, and brine diffuser or injection systems. DOE has adopted this approach because different types of biological resources may be located at each of these often distant locations. The evaluation considered whether the proposed action would be compliant with numerous state and federal regulations and executive orders on the protection of wetlands, special status species, managed fisheries, migratory birds, fish and wildlife resources, and controlling invasive species. These are described in detail in appendices B, D through H, and I.

3.7.1 Methodology

This section describes DOE's approach and assumptions for characterizing the affected environment and analyzing potential impacts on biological resources from construction and operations and maintenance at each proposed new and expansion site and the associated infrastructure.

3.7.1.1 Plants, Wetlands, and Wildlife

DOE first identified the areas that could be affected by the development or expansion of possible storage sites and associated infrastructure based on their conceptual designs. The potentially affected areas include all construction-related areas including equipment lay-down, staging areas, and temporary access roads. To describe the vegetation and wetland communities present in the potentially affected areas, DOE compiled geospatial data from the following sources:

- National Land Cover Dataset (USGS 1992), which is a land classification system for the entire United States;
- State GAP Analysis Program (USGS 2003) land cover datasets, which include a state-specific land classification system; and

- National Wetlands Inventory (USFWS 2005), which describes approximate wetland location and type according to the Cowardin classification system.

DOE performed a site walkover of each proposed new storage site plus portions of pipeline and power line ROWs to verify and update the spatial data and observe firsthand the ecological context. Aerial photographs, site descriptions, and available literature and databases were used to describe the biological conditions at the proposed expansion sites. DOE also conducted a geospatial analysis to supplement information gathered during site visits and agency consultation.

To assess the potential impacts on the various plant communities and wildlife, DOE calculated the area of each land classification type that could be affected during construction and operation and identified the vegetation types and wildlife species that could be affected. DOE used the construction easement and permanent ROWs for the pipelines, power lines, and access roads presented in chapter 2 to calculate the acreage of vegetation and wetland types associated with the potentially affected area of each site. The conceptual site plans, pipeline and power line ROWs, brine diffuser or injection sites, and RWI locations were then modified or shifted to avoid environmental resources to the extent practicable within engineering and cost constraints. A pipeline alignment was selected that followed existing utility/pipeline/roadway and canal corridors as much as feasible and practicable. The Least Environmentally Damaging and Practicable Alternatives for the ROW corridors were developed (where data allowed) by applying a least impact model that identified a route that utilizes existing utility corridors and best avoids wetlands, especially high value forested wetlands. Details on the methodology used in the model and developing the Least Environmentally Damaging and Practicable Alternatives are provided in appendix B. Appendix B also includes figures showing the footprint of the proposed storage sites, terminals, ROWs, off-site facilities, and National Wetlands Inventory maps of wetland types.

This process resulted in an estimate of the potentially affected area to account for all direct and indirect impacts of constructing and maintaining an ROW based on the existing vegetation. DOE used the USFWS National Wetlands Inventory maps to identify the wetlands potentially affected. To provide a summary of the major types of wetland systems, DOE consolidated the categories of the National Wetlands Inventory maps into the categories presented in table 3.7.1-1.

Table 3.7.1-1: Wetland Types and Description

Wetlands Type	Description
Palustrine – forested	Tidal and nontidal wetlands dominated by woody vegetation greater than or equal to 16 feet (5 meters) in height, and wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 5 parts per thousand. Total vegetation coverage is greater than 20 percent. This wetland category includes fresh-water swamps and bottomland hardwood forest.
Palustrine – scrub-shrub	Tidal and nontidal wetlands dominated by woody vegetation less than 16 feet (5 meters) in height, and wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 5 parts per thousand. Total vegetation coverage is greater than 20 percent. The species present could be true shrubs, young trees and shrubs, or trees that are small or stunted due to environmental conditions.
Palustrine – emergent	Tidal and nontidal wetlands dominated by persistent emergent vascular plants, emergent mosses or lichens, and wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 5 parts per thousand. Plants generally remain standing until the next growing season. Total vegetation cover is greater than 80 percent. This category is also referred to as fresh-water marsh.

Table 3.7.1-1: Wetland Types and Description

Wetlands Type	Description
Estuarine – forested	Tidal wetlands dominated by woody vegetation greater than or equal to 16 feet (5 meters) in height, and wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 5 parts per thousand. Total vegetation coverage is greater than 20 percent.
Estuarine – scrub-shrub	Tidal wetlands dominated by woody vegetation less than 16 feet (5 meters) in height, and wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 5 parts per thousand. Total vegetation coverage is greater than 20 percent.
Estuarine – emergent	Tidal wetlands dominated by erect and rooted plants that can live in water, excluding mosses and lichens. Wetlands that occur in tidal areas where salinity due to ocean-derived salts is equal to or greater than 5 parts per thousand and that are present for most of the growing season in most years. Perennial plants usually dominate these wetlands. Total vegetation cover is greater than 80 percent. This wetland category includes saltwater marsh.
Palustrine – aquatic bed	Tidal and nontidal wetlands and deepwater habitats in which salinity due to ocean-derived salts is below 5 parts per thousand and that are dominated by plants that grow and form a continuous cover principally on or at the surface of the water. These include algal mats, detached floating mats, and rooted vascular plant assemblages. Total vegetation cover is greater than 80 percent.
Lacustrine	These include wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses, or lichens with greater than 30 percent areal coverage; and (3) total area exceeds 20 acres (8 hectares).
Riverine	These include all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or water that forms a connecting link between the two bodies of standing water. Upland islands or palustrine wetlands may occur in the channel, but they are not part of the riverine system.
Marine	Open ocean and high energy coastlines with salinities exceeding 30 parts per thousand and little or no dilution except outside the mouths of estuaries.
Palustrine – unconsolidated bottom	These include wetlands and deepwater habitats with at least 25 percent cover of substrate particles smaller than stones and a vegetative cover less than 30 percent. Water regimes are restricted to permanently flooded, intermittently exposed, and semi-permanently flooded. Characterized by the lack of large stable surfaces for plant and animal attachment. Salinity is below 5 parts per thousand.
Palustrine – unconsolidated shore	These wetland habitats have three characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock; (2) less than 30 percent areal cover of vegetation other than pioneering plants; and (3) any of the following water regimes: irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded. Salinity is below 5 parts per thousand.
Palustrine – open water	Small, shallow bodies of open fresh water lacking significant emergent vegetative cover.

Wetlands provide multiple functions and values including groundwater recharge and discharge areas; flood flow alteration; fish and shellfish habitat; food production for aquatic species and wildlife; sediment retention; nutrient removal, transformation, and export; shoreline stabilization; wildlife habitat; recreation; and visual or aesthetic values. DOE considered these functions and values in assessing the

impacts on wetlands, although no formal assessment for permitting of wetland functions and values was conducted. The evaluation of the significance of the potential impact takes into account both direct and indirect impacts, local uniqueness of the resources that would be affected, duration of the impact, and mitigation or compensation measures that would be implemented.

DOE also considered the proposed action in terms of compliance with Executive Order 11990 Protection of Wetlands, 10 CFR Part 1022 (DOE's regulations for complying with the E.O.), Sections 404 and 401 of the CWA, and relevant state regulations.

3.7.1.2 Special Status Species

DOE took special consideration of biological resources regulated by specific regulatory programs, including but not limited to the following:

- Federally listed threatened, endangered, and **candidate species** and designated critical habitat regulated by the federal Endangered Species Act (ESA);
- State-listed threatened and endangered species regulated by laws in each state;
- Species included in the U.S. Forest Service's Regional Forester Sensitive Species List;
- Marine mammals regulated by the Marine Mammal Protection Act; and
- Managed fisheries regulated by the Magnuson-Stevens Fishery Conservation and Management Act (EFH and managed species).

Detailed analysis of each resource is provided as follows in a separate appendix, along with other background information:

- Appendix B on wetlands (as well as floodplains);
- Appendix C on brine discharges to the Gulf Coast;
- Appendix D on species names;
- Appendix E on EFH;
- Appendices F, G, and H on federally listed species in Louisiana, Mississippi, and Texas, respectively; and
- Appendix I on state-listed species.

DOE assessed potential impacts on federally and state endangered and threatened species, managed fisheries, and marine mammals, respectively, based on information provided by and Section 7 Consultation with the USFWS, the National Oceanic and Atmospheric Administration (NOAA) Fisheries, and various state agencies. DOE reviewed the life characteristics, designated critical habitat, and preferred habitat of each special status species against the actions and locations associated with each proposed new and expansion site.

Special status species

State and federally listed threatened, endangered, and candidate species; marine mammals; federally managed fisheries; and the U.S. Forest Service's Regional Forester Sensitive Species.

DOE evaluated the potential impacts of the proposed candidate alternatives and no-action alternative on the federally listed species (see appendices F, G, and H) to prepare and document its findings of “no effect” and “may affect” in accordance with the definitions found in the Final ESA Section 7 Consultation Handbook (Consultation Handbook) dated March 1998 and a letter from USFWS dated September 29, 2005 (see appendix K), as presented below. For the purpose of the evaluation, DOE has defined “may affect” to include “is not likely to adversely affect” or “is likely to adversely affect.”

- **No effect.** The proposed action would not affect federally listed species or designated critical habitat because individuals or suitable habitat for the species are not present in or adjacent to the action area.
- **Is not likely to adversely affect.** The project may affect listed species and/or designated critical habitat; however, the effects would be discountable, insignificant, or beneficial. Certain avoidance and minimization measures may be needed in order to reach this level of effect.
- **Is likely to adversely affect.** Adverse effects to listed species or designated critical habitat may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect would not be discountable, insignificant, or beneficial. If the overall effect of the proposed action would be beneficial to the listed species, but also would be likely to cause some adverse effects to individuals of that species or designated critical habitat, then the proposed action “is likely to adversely affect” the listed species.

The evaluation of significance of the potential impact takes into account both direct and indirect impacts, the duration of the impact, cumulative impacts, and mitigation measures that would be implemented. For the finding of “may affect,” DOE acknowledges that it has not completed onsite surveys where potential habitat exists for a special status species. In those cases, DOE cannot reach a finding of “is not likely to adversely affect” or “is likely to adversely affect.” Therefore, DOE can reach only a finding of “may affect” in the draft EIS. DOE has initiated informal Section 7 Consultation with and secured agreement in principle from USFWS concerning this approach. Once DOE has issued a Record of Decision and selected a specific new site and expansion sites for development, DOE would perform site- and species-specific habitat screenings and/or surveys for all the species that received a finding of “may affect” under that alternative. If any part of the selected action may adversely affect a listed species, DOE would complete a formal consultation with USFWS and/or NOAA Fisheries as mandated under Section 7 of the ESA. If the action may adversely affect a species proposed for listing, DOE would complete a conference with the USFWS and/or NOAA Fisheries. DOE would also consider impacts of the proposed action on candidate species. DOE would prepare a Biological Assessment if the proposed action had the potential to affect a federally listed species or habitat that is designated critical to their survival. DOE would implement any requirements that are contained in the Biological Opinion prepared during formal consultation by USFWS and/or NOAA Fisheries.

For the state-listed special status species, DOE consulted with state agencies (see appendix K) and reviewed the NatureServe Global Conservation Status of the species (NatureServe 2005) to obtain a broader perspective. NatureServe and natural heritage member programs have developed a method for evaluating the relative peril of species. Conservation status ranks are based on a one-to-five scale ranging from critically imperiled (G1) to secure (G5). The global status assessments are based on the best available information and consider a variety of factors such as abundance, distribution, population trends, and threats. Once DOE has issued a Record of Decision and selected a specific new site for development, it would perform site- and species-specific surveys or habitat screenings for all the state-listed species that received a finding of “may affect” under the alternative. DOE would evaluate the impacts on the listed species in consultation with the appropriate state agency. If the selected action would involve a take of a

state-listed species, DOE would secure permits from the appropriate state agency and complete any mitigation required by the permit.

3.7.1.3 Essential Fish Habitat

DOE generated GIS maps with EFH boundaries layered according to each of the offshore elements associated with the proposed new and expansion SPR sites to determine the potentially affected area and assess potential impacts on EFH and managed species in the Gulf of Mexico. The proposed new and expansion SPR sites with offshore elements include Big Hill, Stratton Ridge, Chacahoula, Clovelly, Clovelly-Bruinsburg, and Richton. Based on data from NOAA Fisheries, the composition of species managed under the Magnuson-Stevens Fishery Conservation and Management Act is identical for four of the potential brine diffusion sites and their accompanying pipeline ROWs. EFH data for the Clovelly site is not available; however, given that the environmental conditions at Clovelly are very similar to the other four diffuser sites, DOE assumed that the species composition was similar at all potential SPR sites.

DOE evaluated potential impacts on EFH by defining the spatial boundaries of the EFH close to offshore pipelines and brine diffuser and reviewing the life characteristics and preferred habitat of each managed species with a designated EFH against the offshore actions and locations associated with each proposed new and expansion site. Appendix E is the EFH Assessment Report required by the Magnuson-Stevens Fishery Conservation and Management Act. It provides a more detailed description of the process used by DOE to evaluate the impacts to EFH.

3.7.1.4 Special Status Areas

DOE defined the special status areas to include federally controlled lands (national forests, national parks, national wildlife refuges, wilderness areas, and national marine sanctuaries), wild and scenic rivers, and lands managed by states, including state forests, state parks, bird rookeries, and wildlife management areas. DOE identified these special status areas through geo-referenced data sources including the Texas Colonial Waterbird Census (USFWS 2006a) and ESRI's street map. DOE reviewed the location of such areas in relation to the actions and locations associated with each proposed new and expansion site.

The evaluation of the severity of the potential impact takes into account the uniqueness of the local resources that would be affected, the duration of the impact, direct and indirect impacts, and potential mitigation measures that would be implemented.

3.7.2 Impacts Common to Multiple Sites

This section describes the direct and indirect impacts of the activities that are common at proposed new and expansion sites. The discussion of the common impacts associated with each proposed new and expansion site presents the magnitude of the impacts that would be similar at all locations, thereby avoiding the need to discuss the same impact on a site-by-site basis. Subsequent sections analyze the magnitude of these impacts in the context of the site-specific environment.

The construction and operations and maintenance of a new or expansion SPR site or its associated infrastructure would involve many similar activities across all proposed sites or associated infrastructure. These activities generally would have the same types of impacts, although the scale of those impacts would vary from site to site. For example, clearing a site for construction would result in a loss of vegetation and disturbance to wildlife. The nature and magnitude of these impacts would depend on the size of the area and the specific plant and animal community in and around it. In this section, DOE describes how common activities could generally affect biological resources. The section reflects the general characteristics (upland and wetlands and open water) of an area where a new facility (the storage

site, RWI structure, wastewater treatment plant, tank farm, marine terminal, brine injection diffuser or well injection field, and access road) would be constructed. Because pipeline and power line ROWs represent narrow linear corridors that would be allowed to revegetate, DOE prepared a separate discussion of the common impacts associated with the ROWs. The discussion of the common impacts includes mitigation measures specific to impacts and a discussion of the common mitigation measures that DOE may implement. At the conclusion of the construction impacts section, DOE presents a discussion of common wetland mitigation measures that would be implemented as appropriate. Where appropriate, the unique context and severity of these potential impacts and associated mitigation measures are presented in the site-specific analysis.

3.7.2.1 Construction Impacts

The following subsections present the common impacts associated with construction of all the proposed facilities with the exception of pipeline and power line corridors. The ROWs involve linear construction activities, resulting in short- and long-term impacts that differ from construction of the other facilities. A discussion of the common impacts in proposed ROWs is presented after the discussion of impacts on uplands, wetlands, and open water.

3.7.2.1.1 Clearing, Grading, and Construction Activities

The upland and wetlands portions of all new and expansion storage sites, RWIs, access roads, brine diffusers or injection wells, and terminals would require clearing, grubbing, and grading activities within the proposed site boundary or construction footprint. Additional clearing of a 300-foot (91-meter) security area would be completed around the new storage sites. For existing SPR sites, the additional clearing would occur only around the expansion area. Because no land expansion would occur at the Bayou Choctaw storage site under the proposed action, no additional clearing would be required.

The clearing and grading activities would result in direct and indirect impacts on the upland and wetland communities. Direct impacts would include the conversion of forests and alteration of plant communities. DOE would convert upland and wetland communities within the site boundary into managed lawns, managed fields, emergent wetlands, or open water. Woody vegetation would generally not be permitted to remain at the site or be re-established.

The dust and increased runoff associated with construction activities could affect adjacent plant and wetland communities and affect downstream wetlands by increasing siltation and turbidity. Clearing, grubbing, and grading activities and the loss or alteration of upland plant and wetland communities would also affect some wildlife. Mobile wildlife species, such as deer and birds, would be displaced while less mobile species, such as turtles, snakes, and small rodents, might be unable to escape. Displaced species and species that are not tolerant of human disturbances would migrate from the construction area to suitable surrounding areas if they are able to do so. The displacement could, at least temporarily, increase the density of wildlife in the surrounding areas and increase the inter- and intra-specific competition for available resources, including foraging and nesting areas. Although some individuals would be affected, no changes in wildlife populations are expected to occur on a regional scale. Small animal species, such as reptiles, amphibians, and small mammals, would be excluded from areas that are cleared because of loss of habitat.

In addition to clearing and grading, DOE would import and place fill materials to support permanent infrastructure such as well heads, brine ponds, package wastewater treatment plants, buildings, and access roads. Placement of fill in wetlands would cause a permanent loss of wetland functions and would have the potential to increase erosion and sedimentation into the surrounding areas. Increases in turbidity could decrease the concentration of dissolved oxygen in the water column of nearby water bodies. For

aquatic species, the increase in runoff and erosion and the associated increase in suspended particles during construction could interfere with the ability of those species to respire, feed, and find suitable habitat.

Open water construction, primarily dredging, would affect some **benthic** organisms and their habitat. It could also release sediments into the water column, thereby increasing turbidity and decreasing the concentration of dissolved oxygen. Because of the increased turbidity and reduced concentration of dissolved oxygen, fish and other mobile organisms would likely avoid such areas.

The temporary impacts such as siltation from construction are expected to be relatively small because the construction would be temporary and would use appropriate best management practices required by the approved Erosion and Sediment Control Plan and Stormwater Pollution Prevention Plan and NPDES stormwater permit for construction activities. As described in chapter 2, DOE would adhere to all relevant and applicable state and federal best management standards to minimize erosion and sedimentation. Standard construction operating procedures—including dust suppression, use of silt fencing, silt curtains/cofferdams, sediment detention basins, reseeding, stabilization of denuded areas, slope protection, and use of hay bales—would be employed to reduce impacts.

The impact on wetlands and uplands due to temporary disturbance, permanent conversion, or filling is discussed in the site-specific discussions and appendix B. For the selected alternative, DOE would conduct a delineation of waters of the United States, including wetlands in accordance with the USACE Wetland Delineation Manual (1987) and subsequent regulatory guidance. A wetland delineation is a survey conducted by a qualified person to determine the extent of a jurisdictional wetland and the types of wetland that would be affected by a project. A jurisdictional wetland must exhibit water tolerant vegetation, hydric soils, and wetland hydrology. Wetlands would be delineated on the selected new and expansion sites, along all ROWs, and at all locations for proposed ancillary facilities such as storage terminals and brine disposal well fields. Only wetlands that are regulated under Section 404 and 401 of the Clean Water Act would be delineated. Isolated wetlands are generally not considered within the jurisdiction of the USACE. DOE would coordinate with the appropriate USACE District to secure a jurisdictional determination (or confirmation) of the delineation.

DOE would prepare the appropriate application for a Section 404 Permit from the USACE and the 401 Water Quality Certificate from the relevant state agency. This permit process requires a comprehensive analysis of alternatives to avoid impacts to jurisdictional wetlands and waters of the United States, an analysis of measures taken to minimize impacts, and a compensation plan to mitigate for unavoidable impacts to jurisdictional waters of the United States, including wetlands. Avoidance and minimization strategies could include measures such as refinement or modification of facility footprints to avoid wetlands, minimization of slopes in fill areas, use of geotechnical fabric under wetland fills to minimize mudwave potential, and restoration of the disturbed wetlands outside the permanent footprint of the facility. The compensation plan would be developed by DOE and submitted with the permit application. Compensation for unavoidable impacts to jurisdictional wetlands could take the form of preservation, restoration, or creation of wetlands in the project area or within the watersheds affected. DOE could also use payment of an lieu-of fee where the USACE and state allow such payment or the purchase of mitigation credits from an approved wetland mitigation bank in the appropriate service area (region or watershed). The compensation plan would include provisions for protecting the mitigation site through a conservation easement or similar mechanism and postconstruction mitigation monitoring to evaluate the success of the mitigation. Additional detail on the compensation plan is included section 3.7.2.1.3.

The USACE and state agency would review and approve the compensation plan through the Section 404/401 permit process. DOE's mitigation plan would be consistent with the EPA and USACE proposed rulemaking on wetland mitigation entitled *Compensatory Mitigation for Losses of Aquatic Resources*,

Proposed Rule (33 CFR Parts 325 and 332). DOE's mitigation actions would ensure that the proposed action is compliant with Executive Order (E.O.) 11990 on Wetlands Protection and 10 CFR Part 1022, which are DOE's implementing regulations for the E.O. Dredge spoils, if generated, would be disposed of in a manner approved by the USACE. DOE would identify beneficial uses for the dredge spoil (such as wetland restoration) as appropriate. DOE would secure section 10 permits wherever required for proposed obstructions in navigable waterways that are regulated by the U.S. Coast Guard and USACE under the Rivers and Harbors Act.

3.7.2.1.2 Right-of-Way Construction Activities

DOE would construct power lines, temporary construction access roads, and pipeline ROWs under many of the alternatives considered for the proposed action. Power line construction activities would involve clearing and grubbing, while pipeline construction activities would involve clearing, grubbing, trenching, and grading. Because of its linear nature, an ROW may pass through an array of upland, wetlands, and open-water communities, which dictate different methods of construction. DOE located the ROWs along existing power line, pipeline, canal, and road corridors wherever possible and practicable in order to minimize the disturbance to undisturbed and higher value plant communities and wetlands. As presented in chapter 2, DOE would use specific methods for construction in the following areas:

- Uplands,
- Wetlands without standing water,
- Inundated wetlands (wetlands with standing water),
- Inland open water, and
- Offshore (these methods are presented in terms of brine disposal and offshore pipelines).

DOE would coordinate construction in the ROW, from initial surveying and clearing to backfilling and grading, to minimize habitat disturbance and erosion. These temporary disturbances, at any single point along the new ROW, would last about 6 to 10 weeks. During construction, wildlife would be displaced from within and adjacent to the construction ROW due to the noise, traffic, human activity, and habitat disruption. A small number of animals and **invertebrates** would be unable to escape the construction and would be killed.

Construction of ROWs in upland areas would result in the same common construction impacts as those presented under upland clearing, grading, and construction activities, with some exceptions. During construction, the ROW would be graded where necessary to create a level working surface to allow for safe passage of construction equipment and materials. Trees would be cut to grade. Stumps would be removed only if within 15 feet (4.6 meters) of the pipeline trench, the centerline of a power line, or where safety concerns would dictate. For pipeline trenches, topsoil would be segregated and stockpiled for use as the final backfill material to aid in postconstruction revegetation activities. After the pipeline has been placed and backfilled with subsoil horizons, the topsoil would be placed on top of the ROW and the grade would be returned to its previous topography. Excess excavated material would be removed from the construction area and used as fill material in a suitable upland area.

For power lines, monopoles would be installed, which would require minimal clearing and excavation for the installation of the 75-foot (23-meter) power line pole. Tall vegetation would be removed from the power line corridor.

Construction of ROWs in wetlands that are not inundated would be similar to construction in the uplands. For pipelines, the impact on the wetland community would be based on the length of the wetland crossing. For wetland crossings less than 100 feet (30 meters), wetland soils would be stockpiled in an adjacent upland area within the ROW, allowing the construction ROW width within the wetlands to be

reduced to 85 feet (26 meters) as opposed to 150 feet (46 meters). For wetland crossings more than 100 feet (30 meters), directional drilling would be used where practicable. If directional drilling was not practicable, the full construction ROW (150 feet [46 meters]) would be required for traditional trenching installation. A temporary timber road would be installed to allow passage of equipment with minimal disturbance of the surface and vegetation. The access road would be removed after construction was completed and the footprint would be regraded and revegetated with native species. Trees would be cut to grade, but stumps would be removed only within 15 feet (4.6 meters) of the pipeline trench, the centerline of a power line, or where safety concerns would dictate. Topsoil would be segregated, stockpiled, and used as the final backfill material. A vegetative buffer zone would be left between the wetland and the upland construction areas. Where wetlands are inundated, it may be impossible to segregate and stockpile the topsoil/sediment for reuse in the trench.

Impacts associated with power line construction in wetlands would include the alteration and clearing of some of the vegetation along the ROW. Where feasible, power line poles would not be placed in wetlands. The power line poles placed in wetlands would require access to the pole location, which typically would be from an adjacent pipeline corridor.

The construction of ROWs in inundated wetlands would involve a crane mounted on specially designed pontoons equipped with tracks, referred to locally as a “marsh buggy.”

The marsh buggy would travel along the centerline of the pipeline and excavate the trench. Where possible, staging areas would be set up on **spud barges** temporarily anchored in navigable waterways. As described in chapter 2, pipe

A **spud barge** is a flat-decked floating structure that has devices similar to legs, called spuds, which are lowered from underneath the barge and pushed into the waterway floor to anchor the structure in place.

would be fabricated at the temporary staging area, then floats would be attached to the pipe to minimize dragging through the wetland system, and the pipe would be pushed into the pipe trench. Once the section of pipe has been floated into place, the floats would be cut free and the pipe would be allowed to sink to the bottom of the trench. The marsh buggy would then backfill the trench with the excavated dredge material and the disturbed area would be restored. This process would keep the construction ROW to the minimum width necessary for the pipe trench and the temporary dredge spoil pile. The construction of ROWs in submerged wetlands would affect coastal and estuarine emergent wetlands that are tidally influenced and mostly submerged. Impacts associated with pipelines would include the loss of the vegetative community along the ROW and decreased functions and values of the surrounding wetlands due to increased turbidity, erosion, and sedimentation. In addition to the impacts within the ROW, for remote pipeline routes primarily associated with Chacahoula, temporary staging areas would be established within or adjacent to navigable waters. Because of the submerged conditions, topsoil would not be segregated from the subsoil. Such measures would result in a temporary impact on the vegetative and wetland communities along and adjacent to the pipeline ROW as the emergent wetland vegetation typically would revegetate the area in two to three growing seasons.

Open water construction in a river, lake, or stream would cause temporary sedimentation and turbidity from any pipeline trenching. Trenching would be used in river and stream crossings less than 100 feet (30 meters) wide. Pipeline trenching effects would also include alteration of stream substrate, reduction in macroinvertebrate abundance and diversity, and a potential reduction in fish populations. In small streams, the increased suspended sediment concentration would dissipate relatively quickly depending on stream flow, keeping the impacts of trenching relatively localized. Water bodies less than 33 feet (10 meters) wide typically would be crossed using the open trench methodology in less than a day. Slightly larger streams, between 33 feet and 66 feet (10 and 20 meters) wide, typically would be crossed in 1 to 3 days (Reid and Anderson 2006). Monitoring results have demonstrated that the effects of open trench construction on water quality and macroinvertebrate communities are short term and are not severe (Tsui

and McCart 1980; Reid and Anderson 2006). Power line poles would not be placed in a river or stream, but would be placed at opposite banks and the power line elevated above the river.

The construction of pipelines in inland open water and navigation channels (rivers and streams) 100-feet (30-meters) wide or greater would involve horizontal directional drilling, as described in chapter 2. For such situations, any power lines would be co-located under the water body with the pipeline. The water body would not be affected because the pipeline and power line would be drilled and placed beneath the water body. Indirect impacts in the adjacent open water and navigation channels may result from stormwater runoff and erosion entering the water body from the work zone and staging area.

The construction of pipelines in open coastal waters associated with the brine pipelines and some oil pipelines may involve jet sleds, dredges, or shallow-draft spud barges, and would affect the vegetation and aquatic wildlife in the open water communities. Impacts would include the loss of benthic communities, increased sedimentation in the surrounding area, and increased turbidity in the water column. As described in chapter 2, the use of jet sleds, dredges, or spud barges would be based on site-specific conditions to minimize the area affected by construction operations. The impacts would be temporary and non-persistent impacts as the wildlife and vegetation would return to the area (postconstruction). The impacts created by the construction of a pipeline across a bay or estuary would be temporary, and with the river or stream bed returning to its pre-construction conditions over time. The time required for this to occur would depend on the method of construction and the water and biological conditions.

Temporary impacts, such as siltation from construction, are expected to be relatively small because the construction would be temporary and would use appropriate best management practices in accordance with an Erosion and Sediment Control Plan, Stormwater Pollution Prevention Plan, and an NPDES stormwater permit for construction activities. As presented in chapter 2, DOE would adhere to all relevant and applicable state and federal best management standards to minimize erosion and sedimentation. Standard construction operating procedures—including dust suppression, use of silt fencing, sediment detention basins, reseeded, stabilization of denuded areas, slope protection, and use of silt curtains in open water—would be employed to reduce impacts.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (regrade to preconstruction contours and greater than 100 feet [30 meters]) or in areas containing sensitive habitat. DOE would regrade to preconstruction contours and reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

3.7.2.1.3 Wetland Mitigation Common to Multiple Sites

DOE's primary mitigation measure for wetland impacts would be avoidance and minimization. As described in chapter 2 and in the preceding text, DOE would locate temporary access roads and staging areas in upland areas or would use temporary floating staging areas, as appropriate. Larger wetlands (about 100 feet [30 meters] or wider) would be directionally drilled wherever practicable. DOE would continue to refine the concept plans for the site storage areas and terminals to avoid placing aboveground structures and fill in wetlands as much as practicable. Where the security buffers around the storage areas or permanent ROW easements extended into wetlands, DOE would preserve emergent wetlands and allow herbaceous species to re-establish themselves within the forested wetlands that were cut. Within

the temporary construction easements of the ROWs, DOE would promote the restoration and re-establishment of the existing plant community by stockpiling and reusing the hydric soils (and their diverse seed bank) from the disturbed wetlands. In this way, some wetland functions and values would be preserved. In addition, wetlands would be restored more quickly if there was a temporary impact to wetlands or a permanent conversion from forested to emergent wetlands. For wetland impacts that cannot be avoided, DOE would implement one or more of the following mitigation measures:

- As described in chapter 2, DOE would install trench plugs (using low-permeability clay placed around the pipe) at intervals to prevent the unintentional draining of water from the wetlands or mixing of fresh-water and marine wetland systems.
- Excess dredged material would be disposed of in consultation and in accordance with permits issued by USACE and the state. Dredge spoils would be used for wetland creation or restoration activities wherever possible.
- Where possible, power line poles would not be placed in wetlands.
- If the wetlands are forested, tree stumps and root mass from all plants would be left intact, except where this would interfere with excavation of the pipeline trench.
- For wetlands that are not inundated or that have shallow standing water, equipment would be supported on timber mats or on prefabricated equipment mats. Spoil from the trench would be stored within the ROW on the nonworking side of the pipeline ROW. Topsoil would be stored separately, where appropriate. Stockpiling of soil would be interrupted at appropriate intervals to prevent change of surface water flow (sheet flow). If the bottom of the pipeline trench would be at a lower elevation than the wetlands, a permanent trench plug of impervious clay would be placed into the trench at the wetland boundaries. If a fresh-water marsh (palustrine emergent wetlands) would likely be exposed to brackish or marine water by connection with these water sources via the pipeline trench, then temporary trench plugs would be used during construction and permanent trench plugs would be installed after the pipe is lowered into the trench. The trench plugs would be installed between the fresh-water marsh (palustrine – emergent wetlands) and any adjacent body of water with a higher salinity.
- Excavated wetlands would be backfilled with either the same hydric topsoil that was removed or a comparable material capable of supporting similar wetland vegetation. Original wetland elevations would be restored and adequate material would be used so that following settling and compaction of the material, the proper preconstruction elevation would be attained. After backfilling, DOE would implement erosion protection measures to stabilize and revegetate the site and prevent further wetland degradation.
- DOE would remove all construction-related materials, such as timber mats, rip rap, silt fence, prefabricated equipment mats, and geotextile fabric, upon completing construction. Where the pipeline trench may drain wetlands, DOE would construct trench breakers and/or seal the trench bottom as necessary to maintain the original wetland hydrology. For each wetland area crossed, DOE would install a permanent slope breaker and a trench breaker at the base of the slopes near the boundary between the wetlands and the adjacent upland areas. The trench breaker would be located immediately upslope of the slope breaker. DOE would not use fertilizer, lime, or mulch along the ROW within wetlands, nor immediately upslope from wetlands. Reseeding activities would use a seed mix of native wetland species. For ongoing ROW maintenance, DOE would limit vegetation to a narrow corridor over the pipeline and to either side to facilitate periodic pipeline corrosion and leak surveys. DOE would not use herbicides or pesticides in or within 100 feet

(30 meters) of wetlands. DOE would conduct a postconstruction monitoring program of the disturbed wetlands within the ROWs to ensure that the hydrology and wetland plant community is re-establishing successfully. The monitoring would follow approved procedures contained in the USACE Section 404 permit. If the monitoring showed that wetland plants and hydrology were not successfully re-established, DOE would implement corrective action.

- **Other potential mitigation measures or best management practices (to be considered during permit application and design):**
 - Other than the construction ROW, only use pre-existing roads within wetlands. Do not construct new access roads through wetlands.
 - Assemble a pipeline in an upland area and use the push technique to place the pipe in the trench where water and other site conditions allow.
 - Minimize the duration of construction-related disturbance within wetlands.
 - Schedule the construction-related disturbance during the dry season.
 - Limit construction equipment operating in wetland areas to equipment needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the ROW.
 - Cut vegetation off at ground level, leaving existing root systems in place, except within the path of the pipe trench.
 - Do not pile woody vegetation within wetlands.
 - Do not store hazardous materials, chemicals, fuels, or lubrication oils, or perform concrete coating activities in wetlands or within 30 yards (9.1 meters) of any wetland boundary.
 - Attempt to refuel all construction equipment in an upland area at least 30 yards (9.1 meters) outside a wetland boundary. If construction equipment must be refueled within wetlands, follow fueling procedures outlined in project-specific spill prevention or contingency plans.
 - Do not use rock, soil imported from outside the wetlands, tree stumps, or brush rip rap to stabilize the ROW.
 - If standing water or saturated soils are present, use low-ground-weight construction equipment or operate normal equipment on timber mats or prefabricated equipment mats.
 - Do not cut trees outside the construction ROW to obtain timber for equipment mats.
 - Do not discharge hydrostatic test water into wetlands.

Where jurisdictional wetland impacts cannot be avoided, DOE would conduct the required wetlands delineations, secure jurisdictional determinations, and then complete and submit the appropriate permit application to USACE and the state agency. Unavoidable wetland impacts would be compensated by creating, restoring, and/or preserving wetlands, paying an in-lieu of fee, or buying credits from an approved mitigation bank. DOE would develop and submit the compensation plan as part of the Section 404/401 permit process. Wetland creation would typically involve alteration of an upland (generally through excavation) to create the proper hydrology for wetlands and planting of wetland species at the site. Restoration typically involves the modification of a previously disturbed wetland that may no longer function as a wetland because it has been ditched or drained. The wetland hydrology is restored and wetland species are planted at the site. Wetland preservation typically involves the purchase and preservation in perpetuity of existing wetlands.

Compensation credits and a compensation ratio would be established based on the functions and values of the affected wetland, the acreage of wetland impacts, and the type of compensation offered. Because the

compensation ratio is based on the functions and values of the wetlands and the type of mitigation proposed, one compensation credit does not necessarily equate to one acre of wetlands. The type of mitigation is important in determining how many acres need to be preserved, created, or restored to equal one compensation credit. For example, the compensation required for preservation of wetlands would be much higher than that for wetland restoration to reach one compensation credit.

The type of wetland affected and its rarity are important in determining the compensation ratio. The filling of **palustrine** forested wetlands would cause a complete loss of functions and values of a relatively rare and ecologically important resource. This type of impact would require the highest compensation ratio, such as 5:1 or 7:1. On the other hand, impacts to emergent wetlands within the permanent easement for pipeline corridors would only cause a temporary loss of the wetland functions and values and would probably require compensation at the lowest ratio, such as 3:1 or 2:1.

Representative mitigation ratios for unavoidable impacts to jurisdictional wetlands are presented in Table 3.7.2-1 Wetland Mitigation Ratios. If required by the USACE, the compensation ratios would be determined through a formal assessment of wetland functions and values, which would be completed during the permit application stage. The Vicksburg, Mobile, and New Orleans Districts indicated that they would probably require DOE to use the USACE Charleston District methodology for determining wetland compensation credits (USACE Charleston District 2002).

Table 3.7.2-1: Approximate Wetland Mitigation Ratios

State	Approximate Compensation Requirements		
	High Wetland Functions and Values	Moderate Wetland Functions and Values	Low Wetland Functions and Values
Louisiana	5:1	3:1	2 to 1:1
Mississippi	5:1	3:1	2 to 1:1
Texas	7:1	5:1	3 to 1:1

Notes:

These are estimates of the compensation ratios that may be required by regulatory agencies. The actual requirements would depend on several factors, including existing wetland conditions and their functions and values. If required for the selected alternative, a formal assessment of affected wetland functions and values would be completed to determine appropriate compensation ratios.

Source: U.S. Army Corps of Engineers, New Orleans, Vicksburg, Galveston, and Mobile Districts

3.7.2.1.4 Brine Disposal Systems

New brine disposal systems that discharge into the Gulf of Mexico would be constructed for the proposed new sites at Chacahoula, Richton, and Stratton Ridge. Existing brine disposal systems that discharge into the Gulf of Mexico would be used at Clovelly, Clovelly-Bruinsburg, Big Hill, and West Hackberry. The Bayou Choctaw and West Hackberry expansion sites would use underground injection wells for brine disposal. Brine disposal pipeline and diffuser construction would be similar for each site. The components of the brine disposal system are discussed further in section 2.3.3. Construction impacts would be limited to areas immediately surrounding the pipeline trench and staging area. These impacts would include increased turbidity due to sediment disturbance and noise.

Some loss of common sedentary macroinvertebrates would be expected during the excavation, laying, staging, and hydraulic jetting of the pipeline. Sensitive mobile species, including finfish and marine mammals, would move out of the area during the duration of construction. Impacts associated with pipeline construction would be temporary and organisms would be able to recolonize the area

postconstruction. Because a portion of the diffuser and pipeline would be located in jurisdictional waters, DOE would conduct the required delineations, secure jurisdictional determinations, and complete and submit the appropriate Section 404/401 permit application. The permit/water quality certification would require that impacts to jurisdictional waters be minimized and that appropriate best management practices are implemented to protect aquatic resources.

Brine disposal in the Gulf of Mexico would be associated with new cavern development at proposed new storage sites at Clovelly, Clovelly-Bruinsburg, Chacahoula, Richton, and Stratton Ridge, and at the Big Hill expansion site. The process of brine creation and details on brine disposal are discussed in section 2.3.3, and details on the potential impacts from the brine plume are discussed in section 3.6 and appendices C and E. DOE would secure an NPDES discharge permit from the appropriate state agency for the brine diffusers. The permit would establish effluent discharge standards, a permitted flow rate, and regular monitoring and reporting requirements that protect water quality and aquatic resources.

Several studies have examined the effects of brine discharge on the composition of bottom-dwelling organisms at brine diffuser sites (DOT 1976 V.2; Barry A. Vittor & Associates 2002). In a 2001 to 2002 study on the impacts of the LOOP and associated facilities, no measurable impact on benthic assemblages was found at the brine diffuser site (Barry A. Vittor & Associates 2002). A study conducted by Texas A&M University in 1991 examined the impact of brine discharge from the West Hackberry and Bryan Mound diffuser sites on water quality and associated biota. This study determined through extensive postdisposal analyses of bioassays and sediment samples that impacts associated with brine disposal at these sites have not been significant. No significant biological impacts were observed at either diffuser site and levels of metals, ions, and other contaminants were similar to those detected at control stations. The researchers found that a decrease in the abundance of benthic species occurred mainly within 31 to 2,000 acres (12.5 to 809 hectares) of the diffusers at Bryan Mound and West Hackberry (DOE 1992a). Fish that feed on bottom-dwelling organisms would move from the diffuser area to feed in unaffected areas.

The population of commercially important white shrimp and brown shrimp could vary based upon the salinity changes associated with brine discharge. Subadult brown shrimp prefer high-salinity areas while white shrimp are typically found in areas of lower salinity. White shrimp are thought to have a wider variation of salinity tolerance, but might still move to other areas to avoid higher salinity in the area around the diffuser (DOT 1976 V.2).

3.7.2.1.5 Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act established a new mandate for the NOAA Fisheries, regional fishery management councils, and other federal agencies to identify and protect important marine and **anadromous** fish habitat. The EFH provisions of the Act support one of the Nation's overall marine resource management goals in maintaining sustainable fisheries. Essential to achieving this goal is the maintenance of suitable marine fishery habitat quality and quantity. The fishery management councils, with assistance from NOAA Fisheries, have delineated EFH for federally managed species.

The composition of the federally managed species with designated EFH in the Gulf of Mexico depends on the distance offshore; however, they are largely the same at each of the potential brine disposal sites associated with Big Hill, West Hackberry, Chacahoula, Clovelly, Clovelly-Bruinsburg, Richton, and Stratton Ridge. For the nearshore portions of the brine pipelines located in estuarine environments, the federally managed species with designated EFH are brown shrimp, cobia, gray snapper, greater amberjack, king mackerel, lane snapper, pink shrimp, red drum, red grouper, red snapper, Spanish mackerel, stone crab, and white shrimp (GMFMC 2006). All of these species are also located at the

potential offshore brine diffusion sites, along with spiny lobster and yellowtail snapper. Appendix E includes a detailed discussion of the impacts to EFH and managed fisheries.

DOE evaluated the impacts on EFH recognizing that the managed species found throughout the Gulf of Mexico region are sufficiently mobile to avoid areas of disturbance. Any impacts associated with construction, including increased sedimentation and possible disruption of species movement would be temporary. The potentially affected environment would quickly revert to pre-disturbed conditions once construction had been completed. The only potentially lasting effect of construction could be alteration of sediment type. The increased concentration of suspended and bedded sediments associated with construction may change the composition of the sediment, temporarily altering the diversity of organisms that live in the soft sea bottom. Complete recovery of soft-bottomed benthic communities may take up to 2 years from the time of construction, or longer for shell substrate. Although the recovery period is long, the project area is small relative to the amount of substrate habitat that exists throughout the Gulf of Mexico.

Depending on the site, the brine diffusion systems would operate for 4 to 5 years during cavern solution mining and could alter the physiochemical makeup of the water column. The brine would leave the diffusers at a rate of 30 feet (9.1 meters) per second at or near ambient temperature, and at a concentration of about 260 parts per thousand (ppt). The area immediately adjacent to the brine port nozzles would have an average estimated salinity increase of 4.7 parts per thousand. From the initial diffusion point, the brine would spread outward in plumes of decreasing salinity. The total potentially affected area has been modeled for each site and is presented in appendix B.

The plumes would range in extent, but would generally be similar with respect to shape and maximum salinity increase. The brine discharge for the Chacahoula site would have a slightly higher increase in salinity because of the unusual bathymetry around the brine diffusers (see appendix C). The size of the diffusion plumes would be up to 7.2 square nautical miles (25 square kilometers) for the +1 part-per-thousand contour, 4.0 square nautical miles (14 square kilometers) for the +2 part-per-thousand contour, 2.0 square nautical miles (7.0 square kilometers) for the +3 part-per-thousand contour, and 1.2 square nautical miles (4 square kilometers) for the +4 part-per-thousand contour. However, because of the freshwater influx from the Mississippi River, Gulf of Mexico species are generally more capable of tolerating salinity changes than are those species located near the proposed brine diffuser site. Furthermore, the majority of the federally managed species are mobile and would be able to quickly leave any affected areas. The benthic community near the diffuser could be altered by increased salinity. In addition, the species composition would change slightly to those more tolerant of increased salinity. The area of potential benthic community changes would be relatively small compared to the range of the species found throughout the Gulf of Mexico.

3.7.2.2 Operations and maintenance Impacts

The following subsections discuss the operations and maintenance impacts associated with new and expansion sites and tank farms, RWI structures, pipeline and power line ROWs, and brine diffusion systems.

3.7.2.2.1 New and Expansion Storage Sites and Terminals

The operations and maintenance activities at a new or expansion storage site or terminals would include lawn maintenance, security lighting, equipment maintenance, testing, increased noise from equipment and workers, and vehicular traffic in and around the facility. Such activities would preclude non-tolerant wildlife species from using the site and immediately surrounding habitats. An 8-foot (2.4-meter) higher security fence would be constructed around a new SPR storage facility. The security fence would prevent

most animals from returning to the site; however, some animals such as songbirds, raptors, waterfowl, armadillos, otters, egrets, herons, and alligators have been reported to visit or inhabit the existing SPR storage sites.

The structures and lighting associated with a new or expansion site or terminal may increase the number of injuries or mortality of resident and migratory birds. The proposed sites and terminals are located within two important and slightly overlapping North American migratory flyways—the Central and the Mississippi. The artificial lighting on tall structures can disorient birds migrating at night and cause collisions with the lighted structures or become fatigued from hovering around such light sources (Jones and Francis 2003).

Mitigation: DOE would use down-shielded, low-mast lights on new buildings and storage tanks. Existing SPR facilities mitigate impacts on migratory birds that frequent the facilities during the year (DOE 2004f). During normal operations, environmental safety and health managers survey the property for migratory birds. Nests, when discovered, are flagged for the duration of nesting season and use of certain equipment, such as landscaping equipment or other non-mission critical equipment, is limited or prohibited to minimize the impact on migratory birds. These activities are conducted with the cooperation of the USFWS.

3.7.2.2.2 Raw Water Intake Structure

The operation of the RWI withdrawal during cavern creation, fill, and drawdown would affect aquatic communities by reducing the quantity of water in the water body and potentially altering currents. The intakes for new sites would withdraw up to 1.0 to 1.2 MMBD (42 to 50 million gallons per day) for solution mining during the 4- to 5-year construction of the caverns. The intake also could affect aquatic organisms by entraining organisms small enough to pass through the mesh screens or entrapment of larger aquatic organisms on the screen. Because the RWI structures would have a traveling screen that moves across the intake flow, most organisms would not become impinged for extended periods of time. The screen would travel across the intake current, picking up most aquatic organisms and carrying them back to the stream. Small aquatic organisms, such as juveniles, larval stages, small adults, and dispersed eggs, that are entrained would not be returned to the stream. Larger fish, mammals, and other large animals would be protected from the intake structure by the combination of trashbars, a relatively low intake velocity of about 0.5 feet per second (0.15 meters per second), and the size of the mesh in the screens (about 0.5 inches [1.3 centimeters]). Studies have shown that large volume water intake structures can impinge and entrain thousands of fish during the course of a year, but effective traveling screens and bypass systems can ensure a survival rate of 80 to 90 percent of the impinged fish (Henderson and Seaby 2000). The severity of the impact from impingement and entrainment due to large volume intakes depends on the site-specific conditions at the intake site, the composition and life history of aquatic species, and whether those species disperse eggs in the water column or lay eggs in a nest.

The operation of the water withdrawal pumps at locations along the ICW (for Stratton Ridge, Big Hill, and Chacahoula) would not reduce the quantity of water in the canal because the ICW waterway is tidal; however, the operation of the pumps would have minor localized effects on the currents in the ICW and could affect the salinity gradient by allowing higher salinity water to migrate further upstream. The RWI for the Clovelly site would be located on a tidally-influenced canal and the RWI for the Bruinsburg site would be located on the Mississippi River. The operation of water withdrawal pumps on the Leaf River for the Richton site could significantly reduce the streamflow needed to create habitats for aquatic organisms, including special status species and their designated critical habitats. Further, water withdrawals during low streamflow periods could increase the rate of fish entrainment and impingement in the RWI. This is discussed in detail in section 3.7.7. The operation of the RWI would also generate

noise that could disturb nearby wildlife and aquatic organisms, especially those that are sensitive to disturbance or that may be nesting, breeding, or caring for young. The RWI would also require security lighting and a 300-foot (91-meter) security buffer. Artificial lighting can disorient birds migrating at night and cause them to collide with lighted structures.

The construction and operation of the RWI would require DOE to complete and submit the Section 404/401 permit application to the USACE and appropriate state agency. The permit application would require that DOE demonstrate avoidance and minimization of impacts to aquatic resources. Other resource agencies such as the USFWS, NOAA Fisheries, and the state agency responsible for water resources/fisheries would be involved in the review of the permit application. DOE would coordinate with these agencies during the permit process and incorporate their recommendations into the design of the facility where possible.

Mitigation: Should the RWI be located near a noise sensitive area—for example, a national wildlife refuge, nesting area for a special status species, or bird rookery—noise attenuation (such as concrete enclosures and/or use of low noise pumps) would be incorporated into the structure.

Mitigation: If the selected alternative involves a new RWI and water source with vulnerable special status species, DOE would modify the design and use appropriate screen size, intake velocity, withdrawal limits, and screen orientation to minimize the impact to that species. The design and construction method for the RWI would be reviewed by the USACE, USFWS, NOAA Fisheries, and appropriate state agency as part of the Section 404/401 permit process.

Mitigation: DOE would use down-shielded, low-mast lighting at the RWI to minimize the impacts to migratory birds.

3.7.2.2.3 Rights-of-Way

DOE would actively maintain a portion of the pipeline and power line ROWs to prevent trees and dense scrub-shrub communities from revegetating in the corridor. The maintenance would involve periodic mechanical clearing of shrubs and trees using a mower, bush-hog, or marsh buggy or periodic pesticide application to suppress woody vegetation. The linear corridors created by new and expanded ROWs can contribute to habitat loss and fragmentation and allow the spread of exotic organisms (invasive species). The impacts of an ROW depend highly on the sensitivity of biota and are greatest when the managed vegetative composition of the ROW sharply contrasts with the surrounding habitat (Graham 2002). Some sensitive species, such as neotropical migrant songbirds, that are in decline along the Gulf Coast, have experienced diminished population levels along pipeline corridors 50- to 75-feet (15- to 23-meters) wide due to habitat loss and fragmentation (Rich et al. 1994). ROWs comprised of grasses and shrubs act as barriers to the crossing of other forest sensitive species, limiting overall habitat availability for some organisms and dividing breeding populations. Invasive species and other generalist organisms tolerant of modified and fragmented habitat conditions within the pipeline corridors can out-compete native vegetation that is sensitive to disturbance. Invasive species can reduce local biodiversity by out-competing native species and can reduce local wildlife habitat and food availability. Maintained corridors can lead to the spread of exotic organisms for several years after their creation (Zink et al. 1995). Examples of exotic species prevalent in southern forests and observed during site visits to the proposed storage sites include the Chinese tallowtree and kudzu (Graham 2002). Other invasive species that are likely to be present in uplands, wetlands, or water bodies along the proposed ROWs and/or the storage and terminal sites include hydrilla, giant salvinia, cogon grass, fire ant, zebra mussel, and nutria.

Several of the candidate sites and proposed ROWs have already experienced significant invasion by the Chinese tallowtree, an introduced species. As required by Executive Order 13112 (Invasive Species), DOE would implement appropriate measures to control invasive species on the selected site. Some native plants and wildlife may actually benefit from the creation of herbaceous dominated corridors, especially if the surrounding region is dominated by forest. In such a case, the establishment of a different type of plant habitat can enhance the local plant and animal biodiversity.

The operations and maintenance impacts associated with the power line ROWs would be the same as those described above. Low-growing vegetation would remain intact under the power lines, while tall vegetation would occasionally need to be trimmed to maintain an adequate distance between the tops of trees and the conductors so as to not interfere with safe operation of the power line. Additional impacts would include the potential for mortality of birds and bats resulting from collisions with the lines or poles. Local movements of birds are difficult to predict since they vary seasonally and annually and are often linked to climatic conditions. For this reason, the number of potential collisions with poles and/or power lines cannot be quantified or predicted with any specificity. Habitat adjacent to specific portions of each of the corridors determines bird abundance and the species present within that portion of the corridor.

Some mortality resulting from bird collisions with manmade structures within the power line corridor is considered unavoidable. Anticipated mortality levels are not expected to result in long-term loss of population viability in any individual species for any of the proposed corridors because mortality levels are anticipated to be low throughout the life of the power line. Electrocution is not expected to be a substantial hazard because the lines would be spaced wider than the largest local raptor's (eagles and vultures) wingspan. Furthermore, DOE would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996). None of the towers is anticipated to require lights for aircraft avoidance, which has been associated with nighttime collisions (Kerlinger 2000). Additional impacts to birds listed under the Migratory Bird Treaty Act would include a loss of some vegetation, an important habitat component.

The type and nature of the impact plant communities and wetlands would depend on whether the affected area is located within the permanently maintained easement (about 50 feet [13 meters] wide per pipeline) or within the temporary construction easement. Additional detail on the width and purpose of the permanently maintained easement and temporary construction easement is included in section 2.3.9.

The permanently maintained easement would be actively managed and therefore forested wetlands and upland forests would be converted to herbaceous plant communities. Upland herbaceous and emergent wetlands that were disturbed by construction would re-establish. The upland forest and forested and scrub-shrub wetlands within the temporary construction easement would re-establish within 5-25 years following construction, depending on the type of community affected. DOE would regrade to pre-construction contours, seed with native plant species, and re-apply the original topsoil, which would promote the re-establishment of the impacted community. About 33 to 40 percent of the acreage affected by the ROW would be located within the permanently maintained easement. Appendix B provides the approximate acreage of impacts to wetlands within both the temporary construction and permanently maintained easement.

Mitigation: DOE management practices would reduce the actively managed area through forested areas to within 15 to 25 feet (5 to 8 meters) on either side of the pipeline, which would reduce the effects of habitat fragmentation. Where appropriate and in accordance with Federal Aviation Administration regulations, lighting would not be placed on the power line power poles. For the proposed power lines, DOE would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996). DOE would also conduct postconstruction monitoring of the

ROWs to ensure that the construction easements and wetlands hydrology are restored, original contours re-established, and appropriate species have re-established at the site. If the monitoring shows that restoration of the disturbed wetlands has not been successful, DOE would implement a plan to correct the problem.

Mitigation: DOE would actively manage pipeline ROWs to control invasive species and limit their spread along the corridor. DOE would manage the permanently maintained ROWs in accordance with DOE's 2003 standard procedures for *Offsite Pipeline Maintenance and Repair Instruction* (Publication AS16400.20) (DOE 2003c). DOE would employ the following:

- use seed mixes that are free of noxious or invasive species when reseeding disturbed areas;
- develop a management plan on sites where the Chinese tallowtree or another invasive species has already established;
- monitor the ROW corridors and sites postconstruction to determine if invasive species have colonized the area (DOE would monitor the corridors in accordance with monitoring guidelines established by state and federal resource agencies; DOE would also take corrective action such as pesticide application or mechanical clearing if invasive species become established within the corridor); and
- restore and reseed disturbed areas with native species immediately after final grades have been achieved.

3.7.2.2.4 Brine Disposal Systems

After storage cavern construction, brine would periodically be released into the Gulf of Mexico for cavern drawdown or maintenance. For example, at the existing Big Hill site, DOE released brine 220 times in 2001, 194 times during 2003, and 243 times during 2004 as part of maintenance or drawdown activities. The average brine discharge during those days was about 36,000 barrels/day with a minimum of 158 barrels/day and a maximum of 125,076 barrels/day. This frequency and volume of discharge is probably representative of the brine discharge that would occur at any of the new SPR sites once the caverns were operational. The impacts of brine disposal during operations and maintenance on aquatic organisms would be much smaller than those discussed for brine disposal during construction because the volume and duration of brine discharge during operations and maintenance generally would be less than that during cavern construction.

3.7.2.2.5 Impacts of a Brine or Petroleum Release

As discussed in section 3.7.2.1.4 and 3.7.2.2.1, there is a low risk of an accidental brine or oil discharge during operation of an SPR storage site, pipelines, and petroleum terminal. Although the likelihood of such an event is remote, the consequences of a release could be significant if the release was large and/or it migrated into a sensitive aquatic system or plant community. Sections 3.7.2.1.4 and 3.7.2.2.1 describe the probability of a release and the typical volume involved in past releases at SPR facilities. DOE would notify the appropriate state, local, and federal agencies and respond quickly to contain any release of brine or oil. Nevertheless, a large release of oil could result in mortality for plants and animals through chemical toxicity, physical smothering, respiratory interference, food and habitat loss, and inhalation or ingestion. Impacted communities can take decades to recover from a large release. A release of brine could cause significant and sometimes fatal physiological trauma to plants and animals, especially bird eggs, fish eggs, and fish larvae. If a release occurred, DOE would remediate, restore, and monitor the

impacted area to help mitigate for the impact. As discussed below, the potential impact and response action would be different depending on the type of community that was affected, including the following:

If an upland community was affected by a release, there would probably be plant mortality but most mobile animal species would likely be able to avoid the area. Plants in areas covered by oil could die or be stressed due to chemical toxicity, reduced photosynthetic activity, and reduced growth and reproduction. It is likely that some plants and non-mobile ground dwelling invertebrates and animals would die within the footprint of the area covered by the release. However, a release into an upland would also create a better opportunity to contain and remediate the release, thereby limiting its impact.

If flowing water was affected, the release would potentially be distributed across a larger area. A brine release would be diluted relatively quickly but a release of oil would not. The flowing water would potentially distribute the oil over a wide area and thereby reduce the severity of the impact. However, oil degrades relatively slowly in water and can persist for years. A brine release would have a less severe impact if the receiving water body was a tidally influenced system. A brine release into a fresh-water system would cause more significant impacts, but would not persist. Some sensitive aquatic organisms such as waterfowl, fur-bearing mammals, **phytoplankton** and zooplankton, invertebrates, and some fish larvae would probably die within the immediate area of the brine or oil release. In the case of an oil release, the affected area could remain biologically unproductive for a long period of time unless full restoration was successful.

If a stationary water body was affected, the brine or oil would not be transported as far or diluted as quickly. Therefore, the impact would probably cause a higher incidence of plant and animal mortality. The incidence of mortality from a brine release would be reduced in a marine or estuarine environment because the species are adapted to saline conditions.

If wetlands were affected, the brine or oil would probably not be transported as far or diluted as quickly unless the wetlands were inundated. Therefore, the potential impact would probably be more severe. Emergent wetland plants, invertebrates, and waterfowl within the immediate footprint of the impacted area could die or become severely stressed. If the wetlands were inundated, some fish (especially fish eggs and juvenile fish) and aquatic invertebrates would be affected. If the wetlands were an **estuarine system** with plants and animals adapted to saline environments, the severity of a brine release would be reduced. The productivity of the wetlands could be greatly reduced for a long period unless full restoration was successful.

Mitigation: DOE would notify the appropriate agencies immediately upon a release and attempt to contain it as quickly as possible. DOE would prepare a Spill Prevention, Control, and Countermeasure plan, conduct spill training, and have spill containment equipment onsite so that DOE personnel could respond immediately to contain a release. DOE would establish an agreement with an emergency response contractor to handle large releases, which may require specialized equipment for containment and remediation. If a release occurred, DOE would work with the appropriate resource agencies to assess the extent of impacts to the biological resources and restore the impacted community to the extent practicable.

3.7.3 Bruinsburg Storage Site

This section addresses the following areas:

- The proposed Bruinsburg 160 MMB storage site, associated facilities, and site access road;

- The proposed pipeline, and power line ROWs;
- The proposed RWI structure;
- The proposed terminal in Peetsville;
- The proposed terminal in Anchorage, LA; and
- The proposed 60 brine disposal wells.

At the terminal in Anchorage, LA, DOE would use existing docks at the Placid refinery. Regardless of whether DOE selects the proposed Bruinsburg site, the refinery is upgrading the docks to receive oil tankers. The upgrade would accommodate DOE's dock needs for the marine terminal.

3.7.3.1 Affected Environment

3.7.3.1.1 Bruinsburg Storage Site

Plants, Wetlands, and Wildlife

The proposed Bruinsburg storage site would occupy about 364 acres (150 hectares) located 10 miles (16 kilometers) west of Port Gibson, MS. This area includes the 266-acre (108-hectare) storage site with a 99-acre (40-hectare) security buffer surrounding the facility. The site is in the Bluff Hills ecoregion of Mississippi in the alluvial plain of the Mississippi River (Chapman et al. 2004). The Bluff Hills ecoregion contains a mosaic of habitats including sloping hills, ravines, and small cypress swamps. Approximately two-thirds of the proposed Bruinsburg site is located in a relatively flat landscape, currently occupied by cultivated cotton fields, cypress swamp, and deciduous forest. The remaining one-third of the proposed site, where the administrative buildings, pumps, and brine pond would be located, would encompass an upland area outside the floodplain of the Mississippi River.

The cypress swamp (palustrine forested wetlands) is characterized by large cypress trees situated in 3 to 4 feet (1 to 1.3 meters) of standing water with Spanish moss on the branches. The cypress swamp is surrounded by fresh water emergent wetlands dominated by sedges and grasses. Water oak and hickory dominate the intermittent or semipermanently flooded forested wetlands on the site. Other trees common throughout the forested wetlands include sweet gum, basswood, water oak, tupelo, and box elder. The understory includes holly, bamboo, and arrowwood, while groundcover consists of various grasses and sedges, horsetail, clearweed, and smartweed. Portions of the forested wetlands that were not inundated during the site visit display signs of periodic inundation such as water marks on trees and tree buttressing. Forested wetlands are characterized by water oaks, box elder, and tupelo. The upland forested areas are dominated by oak and hickory, with some sweet gum.

The natural hydrology of the site has been altered by a levee extending across the center of the site separating a bayou from the cotton fields to the north. Beaver dams have further altered the surface water flow by creating temporary ponds along the intermittent streams crossing the central portion of the site. Two intermittent streams converge onsite to form a bayou, which is the only permanent stream within the proposed boundaries. Areas adjacent to the bayou are permanently flooded; the remaining areas show signs of intermittent or semipermanent flooding.

The administrative buildings would be located on the eastern side of the site. This area is characterized by steep rolling hills and ravines covered with mixed hardwood and pine forests. The area appeared previously disturbed due to the presence of bamboo mixed in the interior of the upland forest. The forest is dominated by oaks and hickories intermingled with pine. The **understory** is comprised of herbaceous cover, shrubs, and seedlings.

The wildlife observed in the vicinity of the Bruinsburg site during the site visit includes white-tailed deer, armadillo, beaver, slider turtle, American woodcock, owl, and woodpecker.

The proposed Bruinsburg site is located along the Mississippi River flyway (Birdnature.com 2005). The Mississippi alluvial valley is an important wintering habitat for waterfowl, particularly mallards, wood ducks, and numerous other bird species that are regulated by the Migratory Bird Treaty Act.

Special Status Species

A literature review identified that the following federally listed species may be present within the county where the proposed Bruinsburg storage site is located: the interior least tern, the bayou darter, the pallid sturgeon, and the Louisiana black bear. However, a review of the conditions at the proposed Bruinsburg storage site and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the proposed storage site would not affect any federally listed threatened, endangered, or candidate species (see Appendix G Evaluation and Federally Listed Species in Mississippi).

Species that are listed as threatened or endangered by the states of Mississippi or Louisiana, but that are not federally listed, are summarized in appendix I for the counties or parishes containing parts of the proposed Bruinsburg development.

Special Status Areas

There are no special status areas in or adjacent to the proposed storage site.

3.7.3.1.2 Bruinsburg Rights-of-Way

Four pipelines and five power line ROWs would be required for the Bruinsburg storage site (see figure 2.4.1-1 in chapter 2). An access road to the brine injection wells would follow the brine disposal pipeline ROW.

Pipeline ROWs

- A proposed 109-mile (176-kilometer) crude oil pipeline from the Bruinsburg site to the Anchorage terminal. The pipeline would share an ROW with the brine disposal pipeline and RWI pipeline for 3.5 miles (5.6 kilometers) and then continues in a shared ROW with the brine disposal pipeline for another 10 miles (17 kilometers). Approximately 34 miles (55 kilometers) of the ROW would be along existing ROWs.
- A proposed 39-mile (62-kilometer) crude oil pipeline to the Peetsville terminal. This pipeline would start at the Bruinsburg storage site and end at the Peetsville terminal.
- A 4-mile (6.4-kilometer) RWI pipeline from the Bruinsburg site to the RWI structure on the Mississippi River. The pipeline would share an ROW with the brine disposal pipeline and the crude oil pipeline to Anchorage for 3.5 miles (5.6 kilometers).
- A 14-mile (22 kilometer) brine disposal pipeline and access road from the Bruinsburg site to the brine injections wells. The pipeline and access road would share an ROW with the crude oil pipeline to Anchorage and RWI pipeline for 3.5 miles (5.6 kilometers).

Power Line ROWs

- A proposed 5.4-mile (8.7-kilometer) ROW for a 138-kilovolt power line from the Bruinsburg site to the Grand Gulf substation.
- A proposed 7.2-mile (12-kilometer) ROW for a 138-kilovolt power line from the Bruinsburg site to the Port Gibson substation. This ROW would follow the crude oil pipeline ROW to the Peetsville terminal.
- A proposed 4.1-mile (6.6-kilometer) ROW for dual 34.5-kilovolt power lines from the Bruinsburg site to the RWI structure. This ROW would follow the RWI pipeline.
- A proposed 11.1-mile (17.9-kilometer) ROW for dual power lines to the brine disposal wells from the RWI structure. This ROW would follow the pipeline ROW of the RWI and brine disposal pipeline.

Plants, Wetlands, and Wildlife

About 60 percent of the shared 3.5-mile (5.6-kilometer) ROW for the crude oil, brine disposal, and RWI pipelines would cross hardwood forested habitat. This ROW would include the power line ROW for the RWI structure. According to the National Wetlands Inventory data, most of this forest is palustrine forested wetlands, which is typical of the Mississippi River floodplain. Approximately 16 percent of the area crossed by the proposed pipelines is agricultural land.

The RWI ROW would continue for 0.5 mile (0.8 kilometer) west from the shared existing ROW. Approximately 44 percent of the ROW would cross palustrine forested wetlands. The remaining habitat is a mixture of **riverine wetlands** and hardwood forest.

From the shared ROW, the proposed crude oil and brine disposal pipeline ROW would continue south for 10.3 miles (16.6 kilometers). This ROW would include the power line and access road among the brine disposal wells. Approximately 38 percent of the area that would be crossed by the shared crude oil and brine disposal pipeline ROW is hardwood forest and 15 percent of is transverse palustrine forested wetlands. The remainder is a mixture of grassland and disturbed or management habitat.

The crude oil pipeline would continue from the last brine injection well for 95.5 miles (153.4 kilometers) to the Anchorage terminal. Hardwood forested habitat is the dominant land classification crossed by this ROW. The pipeline ROW would flank the Mississippi River in the alluvial plain, which is characterized by oxbow lakes that are remnants of the former channel of the Mississippi River. Almost 30 percent of the proposed ROW area contains wetlands, most of which are palustrine forested or **scrub-shrub** associated with the floodplain. This proposed ROW follows an existing pipeline ROW for 34.0 miles (54.7 kilometers) that spans from Mississippi into Louisiana, which represents approximately 32 percent of the ROW.

About 60 percent of the land crossed by the proposed crude oil pipeline to the Peetsville terminal and the power line ROW to Port Gibson is forested. Most of the forests consist of deciduous hardwoods with 20 percent of the land classified as evergreen (pine) forest. Most of the evergreen forest land crossed by the proposed pipeline ROW is managed pine plantations. The remaining landscape contains scrub-shrub habitat, which likely includes areas formerly harvested for pine or used in agriculture.

The only power line not following a pipeline corridor would depart from the proposed Bruinsburg site and head northeast for 5.5 miles (8.6 kilometers) to the Grand Gulf Entergy substation. The power line ROW would continue within the alluvial plain of the Mississippi River, avoiding the steep topography

located to the east. More than 70 percent of the proposed ROW contains hardwood forested habitat, most of which is palustrine forested wetlands.

Based on the various land classification types and the wetlands present along the proposed ROWs, several common mammals, birds, amphibians, and reptiles may use the existing habitats in the proposed ROWs. The species would be similar to those described under the proposed Bruinsburg storage site.

Special Status Species

A literature review identified that the following federally listed species may be present within the counties where the proposed ROWs would cross: bald eagle, interior least tern, red-cockaded woodpecker, bayou darter, gulf sturgeon, pallid sturgeon, Alabama heelspitter mussel, fat pocketbook mussel, Louisiana black bear, West Indian manatee, and ringed map turtle. However, a review of the conditions along the proposed ROWs and consultations with the USFWS and the Mississippi Natural Heritage Program revealed proposed pipeline ROWs associated with the proposed Bruinsburg site may affect the fat pocketbook mussel. Although some potential habitat for other federally listed species may exist along the ROWs, DOE has determined there would be no effect to these species (see appendix G).

A population of the federally endangered fat pocketbook mussel was recently discovered in the Mississippi River and associated tributaries in Jefferson County, MS (Aycock 2005; NatureServe 2005). The proposed construction of the pipeline ROW from Bruinsburg to Anchorage passes through Jefferson County and crosses Coles Creek and Fairchilds Creek, which are believed to support the fat pocketbook mussel.

Species that are listed as threatened or endangered by the states of Mississippi or Louisiana, but that are not federally listed, are summarized in Appendix I State Listed Species Screening Evaluation for the counties or parishes containing parts of the Bruinsburg development. The Mississippi Natural Heritage Program did not identify any populations of state-listed species within 2 miles (3 kilometers) of the proposed ROWs. Based on this information, DOE does not expect the proposed ROWs to affect state-listed species.

Special Status Areas

The proposed crude-oil pipeline ROW to the Peetsville terminal would cross through the Natchez Trace Parkway and the proclamation area of the Homochitto National Forest. The Natchez Trace Parkway is a 440-mile (710-kilometer) highway, managed by the National Park Service, created to commemorate an ancient trail that connected portions of the Mississippi River to salt licks located in central Tennessee. The crude oil pipeline would connect with an existing power line corridor before entering the proclamation area, and then it would follow that corridor through the parkway.

The Homochitto National Forest is in southwestern Mississippi. It contains close to 189,000 acres (765,000 hectares) of pine trees and deciduous hardwoods. The proposed crude oil pipeline to the Peetsville terminal from the Bruinsburg site would travel through private property in the proclamation boundary of the Homochitto National Forest for 6.8 miles (11 kilometers). The proclamation area includes land that the Forest Service could acquire in the future to expand the official boundaries of the National Forest. Approximately 5.6 miles (9 kilometers) of the pipeline would run parallel to Highway 550. The remainder of the ROW would follow an existing power line corridor.

3.7.3.1.3 Raw Water Intake Structure

The proposed RWI structure would be located on the Mississippi River approximately 3 miles (5 kilometers) southwest of the proposed storage site. Access to the facility would be available from an existing road; therefore, an additional access road would not be required.

Plants, Wetlands, and Wildlife

The RWI would occupy approximately 1.07 acres (0.43 hectares) along the Mississippi River. The RWI would be located on or adjacent to an existing elevated road. The area along the road is forested, containing similar vegetation as the site of the proposed storage facility. Along the road, some areas have been cleared to attract deer during the hunting season. The site is deciduous hardwood forest, classified as palustrine forested wetlands according to National Wetlands Inventory data. The area is susceptible to periodic flooding by the Mississippi River.

The lower Mississippi River basin fish habitat is characterized by swift current, shifting substrates, high suspended sediment concentrations, and low primary productivity (Wiener et al. 2005). More than 150 species inhabit the lower Mississippi River basin, which includes representatives of the following families: cipenseridae, Catostomidae, Clupeidae, Cottidae, Cyprinidae, Esocidae, Gasterosteidae, Ictaluridae, Lepisosteidae, Poeciliidae, and Polyodontidae (Page and Burr 1991; Froese and Pauly 2006; Hoese and Moore 1998). Most fish reside near the banks of the river and along the channel bottom where the current is slower.

The Mississippi River is an important visual landmark for migratory birds. Numerous North American bird species use the corridor to reach wintering habitat available in the swamps and bottomland hardwood forests of Louisiana, southern Mississippi, and other areas along the Gulf of Mexico. Many of these species are regulated by the Migratory Bird Treaty Act.

Special Status Species

A literature review identified that the following federally listed species may be present within the county where the proposed RWI would be located: the interior least tern, the bayou darter, the pallid sturgeon, and the Louisiana black bear. Consultations with the USFWS and Mississippi Natural Heritage Program determined that the proposed RWI structure may affect the pallid sturgeon. Potentially suitable habitat exists near the RWI structure for the interior least tern, but there are no recorded occurrences of this species within 2 miles (3 kilometers) of the proposed RWI site. DOE determined that the proposed RWI would not affect the interior least tern. Detailed discussion of these species and the habitat found at the site is provided in appendix G.

The pallid sturgeon is a federally listed endangered species known to inhabit the Missouri/Mississippi River drainage. The sturgeon is listed in five counties in Mississippi, including Clairborne County where the proposed RWI structure would be located. This segment of the Mississippi River is not designated as critical habitat for the pallid sturgeon. Adults are seasonal visitors to the area, but larvae and juveniles could be found in this segment of the river year-round. If this alternative is selected, DOE would conduct a survey along this segment to determine if pallid sturgeon is present near the proposed RWI. DOE would initiate formal Section 7 Consultation with the USFWS and NOAA Fisheries if any portion of the project would adversely affect the pallid sturgeon.

Species that are listed as threatened or endangered by Mississippi or Louisiana, but are not federally listed, are summarized in appendix I for the counties or parishes containing parts of the proposed Bruinsburg storage site and related infrastructure. The Mississippi Natural Heritage Program did not

identify any populations of state-listed species within 2 miles (3 kilometers) of the ROWs. Based on this information, DOE does not expect the proposed RWI to affect state-listed species.

Special Status Areas

No special status areas occur in or near the boundaries of the proposed RWI structure.

Essential Fish Habitat

No EFH occurs in or near the boundaries of the proposed RWI structure.

3.7.3.1.4 Peetsville Terminal

Plants, Wetlands, and Wildlife

The proposed 71-acre (29-hectare) Peetsville terminal would be located adjacent to a pump station for the existing Capline pipeline. Managed pine plantations and rural housing surround the site for the proposed terminal, which is recovering from a relatively recent pine harvest. Approximately 53 percent of the site contains scrub-shrub habitat with approximately 27 percent of the total area occupied by hardwood deciduous forest. The remaining area is occupied by evergreen pine forest and disturbed or managed land.

The wildlife in the project area includes common, mobile species such as the nine-banded armadillo and white-tailed deer, which are adapted to living in somewhat disturbed habitat.

Special Status Species

A review of the conditions at the proposed Peetsville terminal and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the proposed terminal would not affect any federally listed threatened, endangered, or candidate species (see appendix G).

The proposed Peetsville terminal does not provide suitable habitat for any state-listed threatened or endangered species (see appendix I) and none were found within 2 miles (3 kilometers) of the proposed Peetsville terminal (MNHP 2006).

Special Status Areas

The Homochitto National Forest is located approximately 2 miles (3 kilometers) west of the proposed Peetsville terminal location.

3.7.3.1.5 Anchorage Terminal

Plants, Wetlands, and Wildlife

The proposed 75-acre (31-hectare) Anchorage terminal would be located south of the Exxon/Mobil and Placid refineries. These facilities flank the Mississippi River levee. The existing land use for the area where the proposed facility would be located is row-crop agriculture. Most of the land surrounding the proposed site is also disturbed and is used for industrial, agricultural, and some residential purposes. According to the National Wetlands Inventory data, there are no wetlands or natural habitat on the proposed site. Because the area is disturbed and actively farmed, it would support only a limited amount of wildlife.

Special Status Species

A literature review identified that the following federally listed species may be present within the county where the proposed Anchorage terminal would be located: bald eagle, pallid sturgeon, and the Louisiana black bear. However, a review of the conditions at the proposed Anchorage terminal and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the proposed terminal would not affect any federally listed threatened, endangered, or candidate species (see appendix G).

The proposed Anchorage terminal site also does not provide suitable habitat for any state-listed threatened or endangered species (see appendix I) and none was found within 2 miles (3 kilometers) of the proposed terminal (MNHP 2006).

Special Status Areas

No special status areas are located in or near the boundaries of the proposed terminal.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed terminal.

3.7.3.1.6 Brine Injection Wells

Sixty brine disposal injection wells, each occupying an area of about 1.2 acres (0.5 hectares), would be located at 1,000-foot (300-meter) intervals along 11.2 miles (18.0 kilometers) of the proposed pipeline ROW from the Bruinsburg site toward Anchorage.

Plants, Wetlands, and Wildlife

The area proposed for the brine injection wells is located east of the Mississippi River in the Holocene floodplain of the Mississippi alluvial plain. The area is characterized by oxbow lakes, natural levees, and abandoned channels separated by upland hardwood forests and agricultural land. The land that would be affected by the proposed wells is roughly half hardwood deciduous forests and half agricultural land. According the National Wetlands Inventory data, 20 percent of the affected area is classified as palustrine forested or scrub-shrub wetlands.

Special Status Species

A literature review identified that the following federally listed species may be present within the county where the proposed brine injection wells would be located: the interior least tern, the bayou darter, the pallid sturgeon, and the Louisiana black bear. However, a review of the conditions at the proposed brine injection wells and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the proposed injection wells would not affect any federally listed threatened, endangered, or candidate species (see appendix G).

The brine injection wells do not provide suitable habitat for any state-listed threatened or endangered species (see appendix I), and none was found within 2 miles (3 kilometers) of the proposed wells (MNHP 2006).

Special Status Areas

No special status areas are located in or near the boundaries of the proposed brine injection wells.

3.7.3.2 Impacts

3.7.3.2.1 Bruinsburg Storage Site

Plants, Wetlands, and Wildlife

The clearing and grading associated with the Bruinsburg storage site would affect about 364 acres (147 hectares). This area would include the 266-acre (108-hectare) storage site with a 300-foot (91-meter) cleared security buffer surrounding the site and the 0.6-mile (0.9-kilometer) long site access road. Trees would be removed within the security buffer; however, emergent wetlands vegetation and herbaceous upland species would be allowed to revegetate following construction. Preparation of the site for the administrative buildings and brine disposal pond would require clearing, filling, and grading of steep, forested ravines. The proposed construction of the site and the access road would affect the following areas:

- 28 acres (12 hectares) of evergreen (pine) forest,
- 115 acres (47 hectares) of hardwood forest,
- 103 acres (42 hectares) of palustrine forested wetlands (cypress swamp),
- 30 acres (12 hectares) of grassland and scrub-shrub,
- 87 acres (35 hectares) of disturbed or managed land, and
- 38 acres (16 hectares) of water or emergent wetlands.

Clearing and grading the palustrine forested wetlands would permanently fill 103 acres (42 hectares), the impacts of which are described in section 3.7.2. Although the forested wetlands are adjacent to actively managed cotton fields, the forested wetlands contain large cypress trees, which indicate that the wetlands have been relatively undisturbed for several decades. Clearing and grading of the forested wetlands would result in the loss of a relatively stable and ecologically valuable ecosystem capable of supporting a variety of wildlife species. DOE modified this facility footprint and shifted the administrative buildings to the east to avoid wetlands. The small size and configuration of the salt dome makes it impractical to further reduce or avoid wetlands impacts. If this site is developed, this ecologically important wetlands may be adversely affected, which would be mitigated somewhat by compensating for the impacts to jurisdictional wetlands.

If this alternative is selected, DOE would complete a wetlands delineation and secure a jurisdictional determination from the USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and preserve onsite emergent wetlands to the maximum extent practicable. DOE would submit a Joint Permit Application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in the Common Impacts section (section 3.7.2) and in accordance with the 404 permit and 401 Water Quality Certificate from the USACE and the Mississippi Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetlands impacts.

As discussed in section 3.7.2, Common Impacts, some wildlife would be killed or displaced to surrounding areas during construction. The forested wetlands habitat continues 1 mile (2 kilometers) to Bayou Pierre. It would provide sufficient habitat for displaced wildlife. Common animals such as white-

tailed deer and nine-banded armadillo could find sufficient habitat in the surrounding area, including locally abundant upland forested areas. After the security fencing is constructed, wildlife use of the site would be limited; however, some mobile species and birds would still visit the site.

The operations and maintenance activities described in section 3.7.2 would preclude wildlife sensitive to human disturbance from entering the area. These animals either would adapt to the disturbance or would move to new habitat. Similar forested habitat is available adjacent to the proposed site. Most common species (e.g., deer and armadillos) could tolerate noise and activities at the new SPR facility. The construction, operations, and maintenance impacts might disrupt individual animals, but would not alter the state or regional population or viability of these wildlife species.

The proposed construction of the Bruinsburg site and related infrastructure would affect aquatic and terrestrial species such as beavers, amphibians, small reptiles, and fish that use the cypress swamp. The downgradient wetlands offsite would experience some sedimentation and temporary water impacts as the site vegetation is removed, the surrounding wetlands filled, and local streams diverted. Aquatic organisms would need to find suitable aquatic habitat in the adjacent wetlands or other nearby streams.

The clearing, filling, and grading of the steep, forested ravines in site preparation for the administrative buildings and brine pond would cause construction-related erosion. As presented in chapter 2, erosion would be minimized with the use of best management practices. An erosion and sediment control plan and NPDES stormwater permit issued by the Mississippi Department of Environmental Quality for construction activities would be secured, which would require the use of best management practices to minimize the impact to water bodies. After site preparation is completed, DOE would grade and contour the adjacent hillside at a slope that allows revegetation of herbaceous plants, which plants would help control runoff, minimize erosion, and stabilize the surrounding ravines.

The potential for operational and maintenance impacts on migratory birds is described in section 3.7.2.

Mitigation: DOE would use low-mast, down-shielded lights to minimize the impacts to migratory birds. DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. If this candidate alternative is selected, DOE would conduct a survey of raptor nests and secure any necessary permits in accordance with the requirements of the Migratory Bird Treaty Act.

Special Status Species

The proposed Bruinsburg storage site would not affect any federally listed threatened or endangered species, candidate species, or designated critical habitat (see appendix G).

DOE would conduct a habitat assessment to determine if any areas of the ROWs meet the habitat requirements of state-listed species presented in appendix I and to determine if surveys are necessary.

Special Status Areas

No special status areas are located in or near the boundaries of the proposed site.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed site.

3.7.3.2.2 Bruinsburg Rights-of-Way

Plants, Wetlands, and Wildlife

Construction in the pipeline and power line ROWs would result in clearing all the vegetation within the ROW. The ROW clearing would affect the following land types as determined by Gap Analysis Program data (USGS 2003):

- 243 acres (98 hectares) of evergreen (pine) forest,
- 926 acres (375 hectares) of deciduous forest,
- 463 acres (187 hectares) of grassland and scrub and shrub habitat,
- 453 acres (183 hectares) of disturbed or managed areas,
- 106 acres (43 hectares) of water and emergent wetlands, and
- 5 acres (2 hectares) of other land categories that could not be determined with available data.

Some of the evergreen and deciduous forested habitat has already been disturbed and fragmented from existing pipeline corridors, agricultural lands, and pine plantations.

GAP Analysis Program data do not accurately classify wetlands areas, particularly forested wetlands. DOE used National Wetlands Inventory data and the proposed construction easements to determine that the ROWs would affect the following wetlands:

- 216 acres (87 hectares) of palustrine forested wetlands (cypress swamp),
- 44 acres (18 hectares) of palustrine scrub-shrub wetlands,
- 5 acres (2 hectares) of palustrine unconsolidated bottom, and
- 69 acres (28 hectares) of riverine wetlands.

The proposed pipeline and power line corridors would permanently affect about 33 to 40 percent of the acreage described above because only a 50-foot-wide (15-meter-wide) easement per pipeline would be maintained permanently. The vegetation in the construction easement would be cleared, but DOE would regrade to preconstruction contours and reseed with native species in this area to re-establish native habitat. The area within the permanent easement would be permanently maintained, but some wetlands functions would be restored because the area would be regraded to preconstruction conditions and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands and the nature and amount of wetland impact from the permanent and construction easements. In addition, many of these wetlands would be avoided by the use of directional drilling under the wetlands from the adjacent uplands. Moreover, about 34 percent of the pipeline ROWs would be within or parallel to an existing ROW. Use of existing ROW corridors to the maximum extent practicable would minimize the impact to undisturbed communities and wildlife.

In accordance with the Section 404/401 permit conditions, DOE would compensate for the jurisdictional wetland impacts.

As stated in the section 3.7.2, construction in the proposed ROWs would displace or kill some aquatic and terrestrial wildlife. Noise and human activity may temporarily preclude some animals from using the nearby habitat. The duration of construction through these areas would be short (6 to 10 weeks at any one location) and ample habitat would be available nearby for most species. The elevated portion of the power lines could represent a strike hazard for resident and migratory birds; however, the maximum tower height is expected to be 75 feet (23 meters), which would greatly reduce the hazard. These impacts may disrupt individual animals, but they would not alter the regional population or species viability.

The impacts associated with the operations and maintenance of the proposed ROWs is described in section 3.7.2).

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct any problems that are identified.

DOE would use low power line poles (less than 75 feet [23 meters]) and would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996).

Special Status Species

The federally endangered fat pocketbook mussel is believed to be present in Coles Creek and Fairchilds Creek, both of which would be crossed by the ROW to Anchorage. Coles Creek would also be crossed by the access road to the brine injection wells. Because these tributaries are small, conventional construction methods (e.g., open-ditch excavation) would normally be used to bury the pipeline below the streambeds. During construction of the stream crossings at Coles and Fairchilds Creeks, excavation may directly affect fat pocketbooks, if they are present. In addition, construction would temporarily disrupt sand, silt, or clay streambed habitat favored by the species. If construction were to occur during the reproductive stage (July to October) of the species, construction may drive away hosts of the mussel's larval stage, such as red drum or other fish.

If the Bruinsburg site is selected for development, a qualified biologist would survey Coles Creek or Fairchilds Creek in the area of the proposed crossings to determine if the fat pocketbook mussel is present. If the mussels are identified in those areas, DOE would initiate formal Section 7 Consultation with the USFWS and complete a Biological Assessment if required. DOE would use directional drilling to avoid disturbance to the stream, if practicable or the mussels would be relocated to suitable habitat outside the area of disturbance. Relocation of fresh-water mussels has been documented as a successful strategy to avoid impacts during instream construction disturbances (Reutter et al. 2001). After construction, the streambeds would be restored to their original condition. Operations and maintenance of the pipelines would not affect the mussels because such activities would be minor and infrequent.

A small bridge or box culvert would be built for the brine access road to cross Coles Creek. Construction of the box culvert may have a temporary effect on the mussels (if they are present) because some in-stream disturbance would occur even with best management practices to control siltation. The streambed would be restored after construction. Operations and maintenance of the road would occur infrequently and would not affect the mussels.

Special Status Areas

The proposed crude oil pipeline to the Peetsville terminal would cross the Natchez Trace Parkway in an existing utility ROW and would follow an existing highway through private land within the proclamation boundary of the Homochitto National Forest. Construction through the Natchez Trace Parkway would require an expansion of the existing ROW and the clearing of additional vegetation; however, the existing

corridor has already fragmented the forest. Construction of the pipeline through the proclamation boundary of the national forest would also require clearing of additional vegetation along the highway easement. Trees would not be allowed to regrow within the 50-foot (15-meter) maintained easement; though the remaining area affected by construction would be allowed to regenerate to natural habitat. Use of existing ROW and road corridors to the maximum extent practicable would minimize the impact to undisturbed communities and wildlife.

Mitigation: If the Bruinsburg site is selected, DOE would coordinate with the National Park Service to obtain the proper ROW easements through the Natchez Trace Parkway and ensure that important natural resources are avoided to the maximum extent practicable.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat such as wetlands or habitat for special status species. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

Essential Fish Habitat

No EFH exists in or near the pipeline and power line ROWs.

3.7.3.2.3 Raw Water Intake

Plants, Wetlands, and Wildlife

Section 3.7.2 describes construction impacts associated with the RWI structure. The clearing and grading associated with construction of the RWI structure would affect 1.7 acres (0.7 hectares) of forested and wetlands habitat.

If a Bruinsburg alternative is selected, DOE would complete a wetlands delineation, secure a jurisdictional determination from the USACE, and refine the conceptual site plan to avoid filling in jurisdictional wetlands to the maximum extent practicable. DOE would submit a Joint Permit Application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetlands impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the Section 404 permit and Section 401 Water Quality Certificate from the USACE and the Mississippi Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the wetlands impacts.

As presented in chapter 2, erosion would be minimized with the use of best management practices. An erosion and sediment control plan and NPDES stormwater permit issued by the Mississippi Department of Environmental Quality for construction activities would be secured, which would require the use of best management practices to minimize the impact to water bodies.

As discussed in section 3.7.2, some wildlife species would be displaced to similar vegetative and wetlands communities surrounding the RWI structure. Dredging required for construction of the RWI structure would affect some aquatic organisms and temporarily increase suspended sediment in the water

column. Mobile species could move away from the construction area. The Mississippi River, in the area of the RWI structure, is a heavily traveled corridor for large barges and other vessels. Most aquatic species would be tolerant of noise and human activity.

Operations and maintenance of the RWI structure would produce noise during cavern solution mining (4 to 5 years) and after construction and during maintenance and drawdown. Noise may preclude sensitive terrestrial and aquatic wildlife from using habitat in the immediate vicinity of the RWI structure. During water withdrawal activities and operation of the RWI structure, some aquatic organisms would become entrained or impinged by the intake, especially larval forms, juveniles, and dispersed fish eggs.

The planned 1.2 MMBD (50 million gallon per day water withdrawal would be a small fraction of the total flow, and the potential for entrainment and impingement would be minimized by equipping the RWI with appropriate screen diameter, intake velocities, and traveling screens to collect and return aquatic life to the Mississippi River.

Section 3.7.2 provides a description of other operations and maintenance impacts including artificial lighting and increased human activity that could affect migratory birds and other wildlife.

Mitigation: As described in section 3.7.2, DOE would use down-shielding and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE, in cooperation with USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. As described in chapter 2, DOE would use noise attenuation measures such as use of a concrete enclosure for the pump station to minimize noise impacts.

Special Status Species

Construction of the RWI on the Mississippi River would not be likely to cause an adverse affect on the federally endangered pallid sturgeon and would not affect designated critical habitat. Construction activities would temporarily disturb a small area of the Mississippi River bottom and resuspend sediments; however, impacts on water quality would be negligible because of the large size and flow rate of the Mississippi in this area. Similarly, impacts on habitat characteristics would be inconsequential because of the small size of the area affected. Any potential construction impacts would be minimized with the use of onshore erosion barriers, instream silt curtains or cofferdams, postconstruction restoration, and other measures.

Operation of the RWI would have the potential to entrain and impinge juvenile and larval sturgeon and their prey. If an alternative with the Bruinsburg site is selected, DOE would initiate formal Section 7 Consultation with the USFWS and NOAA Fisheries. DOE would prepare a Biological Assessment, if required, and implement any conditions of a Biological Opinion. In addition, DOE would work with USFWS and NOAA Fisheries to design the RWI with appropriate mesh size, intake velocity, and other technologies to avoid adverse impacts. Because the planned 1.2 MMBD (50 million gallons per day) raw water withdrawal would be a small fraction of the daily flow of the Mississippi, there would be no significant changes in the water conditions or flow regime due to operation of the RWI.

Essential Fish Habitat

No EFH is in or near the proposed RWI structure.

Special Status Areas

No special status areas are in or near the proposed RWI site.

3.7.3.2.4 Peetsville Terminal

Plants, Wetlands, and Wildlife

The clearing, grading, and construction of the tank farm associated with the Peetsville terminal would affect about 71 acres (28 hectares) as follows:

- 10 acres (4 hectares) of evergreen (pine) forest,
- 18 acres (7 hectares) of hardwood forest,
- 35 acres (14 hectares) of grassland scrub-shrub habitat,
- 3 acres (1 hectare) of disturbed or managed land, and
- 5 acres (2 hectares) of other land.

If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible, although the entire footprint would be cleared of trees for security reasons. The placement of fill in the wetlands would cause a permanent loss of wetland functions and values. DOE would secure permits from the USACE and Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail. DOE would implement best management practices and comply with permits for erosion and stormwater control during construction and operation of the facility to reduce impacts to aquatic species.

After the security fencing is constructed, wildlife use of the site would be limited; however, some mobile species and birds would probably still visit the site.

The operations and maintenance activities, described in section 3.7.2, may preclude wildlife sensitive to human disturbance from entering the area. These activities at the terminal would be infrequent and similar to activities occurring at the oil pump station adjacent to the proposed terminal. This area has already been disturbed by past construction and habitat fragmentation.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts and impacts to forests.

Special Status Species

No federally or state-listed threatened or endangered species would be affected by the construction of the Peetsville terminal (see appendix I).

Special Status Areas

The Peetsville terminal would not affect the Homochitto National Forest, which is located 2 miles (3 kilometers) to the west.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed Peetsville terminal.

3.7.3.2.5 Anchorage Terminal

Plants, Wetlands, and Wildlife

The clearing and grading associated with the Anchorage marine terminal would affect about 71 acres (28 hectares). As described in section 3.7.3.1.5, the proposed facility would be located entirely within actively managed agricultural land; therefore, no natural habitat or wildlife would be affected. No wetlands would be disturbed by clearing and grading activities. Rodents and common organisms living in the fields could find available habitat in other fields near the proposed facility. After the security fencing is constructed, wildlife use of the site would be limited. Some mobile species and birds would probably still visit the site, however.

The operations and maintenance activities described in section 3.7.2 would preclude wildlife sensitive to human disturbance from entering the area. The efforts to operate and maintain the terminal would be similar to activities occurring at other industrial facilities located near the proposed site. Although these construction, operations, and maintenance activities may affect individual organisms, they would not alter the regional population or species viability.

Special Status Species

No federally or state-listed threatened, endangered, or candidate species would be affected by the proposed terminal (see appendices G and I).

Special Status Areas

No special status areas exist in or near the boundaries of the proposed facility.

Essential Fish Habitat

EFH is not present at the proposed Anchorage terminal site.

3.7.3.2.6 Brine Injection Wells

Plants, Wetlands, and Wildlife

Construction of the brine injection wells would result in clearing all vegetation at those sites. The following habitats would be affected according to Mississippi GAP Analysis Program data (USGS 2003):

- 2 acres (1 hectare) of evergreen (pine) forest,
- 31 acres (21 hectares) of deciduous forest,
- 8 acres (3 hectares) of grassland and scrub-shrub habitat,
- 21 acres (8 hectares) of disturbed or managed habitat,
- 11 acres (5 hectares) of open water and emergent wetlands, and
- < 1 acre (< 0.04 hectare) of other land categories that could not be determined with available data.

GAP Analysis Program data do not accurately classify wetlands areas, particularly forested wetlands. DOE used National Wetlands Inventory data to determine that the brine injection wells would affect the following wetlands:

- 17 acres (7 hectares) of palustrine forested wetlands, and
- 9 acres (4 hectares) of palustrine scrub-shrub wetlands.

Clearing and grading the palustrine forested wetlands would permanently fill about 9 acres (4 hectares). The impacts associated with clearing and filling wetlands are described in section 3.7.2. If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible, although the entire footprint would be cleared of trees for security reasons. DOE would secure permits from USACE and Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and provide compensation for unavoidable wetland impacts. After security fencing is constructed, wildlife use of the site would be limited, though some mobile species and birds would probably still visit the area enclosed near the brine injection wells.

Operation of the brine injection wells would produce some continuous noise during the 3 year period of cavern construction and may thus preclude wildlife sensitive to human disturbance from entering the area. These organisms would either adapt to the disturbance or move to new habitat. Most common species (e.g., deer and armadillo) could tolerate noise and activities associated with the brine injection wells.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts and impacts to forests.

Special Status Species

The proposed Bruinsburg brine injection wells would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

No special status areas exist in or near the proposed brine injection wells.

Essential Fish Habitat

No EFH exists in or near the proposed brine disposal injection wells.

3.7.4 Chacahoula Storage Site

This section addresses the following areas:

- The proposed Chacahoula storage site, associated facilities, and access road;
- Four pipelines and four power lines:
 - a crude oil distribution pipeline to St. James,
 - a crude oil distribution pipeline to Clovelly,
 - a brine disposal pipeline to the Gulf,
 - an RWI pipeline to the ICW,
 - a power line from Thibodaux substation to the site,
 - a power line from Terrebonne substation to the site, and
 - two power lines from existing power lines north of Highway 90 to the RWI;
- The RWI structure and access road; and
- The offshore pipeline and the brine diffusion system.

3.7.4.1 Affected Environment

3.7.4.1.1 Chacahoula Storage Site and Access Road

Plants, Wetlands, and Wildlife

The proposed Chacahoula storage site is located to the west of Route 309 in southwestern Lafourche Parish, LA, in the Sub-tropical Division, Outer Coastal Plain Mixed Forest Province (Bailey 1995). The proposed site would encompass 230 acres (92 hectares) with a 1.5-mile (2.4-kilometer) access road. The habitat consists of cypress-tupelo swamp, classified by National Wetlands Inventory data as palustrine-forested wetlands. This swamp is associated historically with Bayou Lafourche and locally with the Bubbling Bayou and other canal-like bayous. The site is located within a large continuous patch of a cypress-tupelo swamp, which has limited areas of oil and gas development, but remains largely undisturbed.

The entire site is typically flooded, and it has interspersed hammocks of dry or seasonally flooded land formed by sediment deposits. The National Wetlands Inventory data classify the entire site as palustrine, semi-permanently flooded, broadleaf deciduous or needle-leaf deciduous wetlands. The swamp is dominated by bald cypress and water tupelo. Other tree species include ash, maple, black willow, and water oak. Understory vegetation includes greenbriar, palmetto, blackberry, trumpet vine, Virginia creeper, holly, and grape. Deep water areas are devoid of living trees and are covered by a vegetated mat.

The cypress-tupelo swamp is an important fresh-water ecosystem that was once common throughout the southeastern United States. Logging and development pressures have destroyed much of this ecosystem. In Lafourche and Terrebonne Parishes, many of the swamps have been drained and converted to agricultural, residential, or industrial use. The remaining swamps are a critical part of the natural landscape. Generally, their functions include nutrient transformation, flood storage, wildlife habitat, and timber production. Locally, forested wetlands can mitigate the negative impacts of nonpoint source pollution, protect adjacent land from flood waters, and provide economic benefit to local communities through recreational and commercial uses. The forested wetlands of Louisiana are a stopover for millions of migrating birds. The wetlands provide important resources to dozens of species of wading birds. They also serve as a carbon sink, which is a natural environment that absorbs and stores more carbon dioxide from the atmosphere than it releases offsetting greenhouse gas emission (Coastal Wetlands Forest Conservation and Use Science Working Group 2006).

The area supports numerous bird species that are regulated by the Migratory Bird Treaty Act. The site provides habitat for a large number of terrestrial and aquatic wildlife species including rabbit, squirrel, raccoon, nutria, mink, deer, woodcock, wood duck, crayfish, and various species of fish. The area also provides important resources for wide-ranging predators such as bobcats and coyotes.

Many of the fish species found at or near the site are common throughout the Gulf Coast region. Typical species include fresh-water eels, suckers, minnows, sunfishes and basses, mullet, perch and darters, and fresh-water catfish. Invertebrate species found in the bayous and sloughs are typical of any fresh-water system along the Louisiana swampland. Reptiles such as turtle, American alligator, water moccasin, and western diamondback rattlesnake are often observed in the swamps around the Chacahoula site.

Special Status Species

A literature review identified that the following federally listed species may be present within the parish where the proposed storage site would be located: bald eagle, brown pelican, peregrine falcon, piping

plover, and the gulf sturgeon. However, a review of the conditions at the proposed site and consultations with USFWS and the Louisiana Department of Wildlife and Fisheries revealed that there may be suitable habitat for the bald eagle at the proposed storage site. As discussed in appendix F, USFWS and Louisiana Department of Wildlife and Fisheries confirm a recorded bald eagle nesting site within 1 mile (2 kilometers) of the proposed storage site (Lester 2006). The bald eagle is a federally listed threatened species. Much of the habitat surrounding the site and associated infrastructure is cypress-tupelo swamp that could serve as potential habitat for bald eagles, which are known to nest in bald cypress trees near fresh to brackish marshes (estuarine emergent wetlands) or open water in the southeastern parishes (Carloss 2005). The USFWS has proposed removing the bald eagle from the ESA list.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed site.

Special Status Areas

There are no special status areas in or near the proposed Chacahoula storage site.

3.7.4.1.2 Chacahoula Rights-of-Way

Four pipelines and three power line ROWs would be required for the Chacahoula storage site. To reduce the impacts from this infrastructure DOE would co-locate many pipelines and power lines and place them adjacent to existing utility corridors where feasible.

Pipeline ROWs

- The proposed crude oil pipeline to St. James would share an ROW for 1 mile (1.6 kilometers) with the crude oil pipeline to Clovelly. Then, it would follow existing ROWs to the north/northeast for 20 miles (32 kilometers) to the existing terminal at St. James.
- The proposed crude oil pipeline to Clovelly would share an ROW for 1 mile (1.6 kilometers) with the crude oil pipeline to St. James. It would then continue east on a new ROW for 23 miles (37 kilometers), joining an existing ROW southeast for 30 miles (48 kilometers) to the LOOP underground storage facility at Clovelly.
- The proposed RWI pipeline would share a new ROW for 0.4 miles (0.7 kilometers) with the brine disposal pipeline. It would be co-located with the brine disposal pipeline on an existing ROW for another 6.7 miles (11 kilometers), heading south before turning to the RWI located 5.3 miles (8.6 kilometers) to the southwest.
- The proposed brine disposal pipeline would share a new ROW for 0.4 miles (0.7 kilometers) with the RWI pipeline and share an existing ROW with the RWI pipeline for another 6.9 miles (11.0 kilometers) heading south. It would then continue on a new ROW for 4.3 miles (6.8 kilometers) before joining an existing ROW for 26.8 miles (43 kilometers). The final 2.3 miles (3.7 kilometers) of the route to the beach would be through a new ROW before heading offshore 17 miles (28 kilometers) to the diffuser.

Power Lines ROWs

- A proposed 7.1-mile (11-kilometer) power line from Thibodaux substation would join a 15-mile (24-kilometer) power line from Terrebonne station, and then follow the proposed pipeline ROW to the site for 2.5 miles (4.1 kilometers).
- A proposed power line would extend 4.5 miles (7.3 kilometers) south to the RWI.

Plants, Wetlands, and Wildlife

About 50 percent of the proposed corridor for pipelines, power lines, and access roads would follow existing utility corridors; therefore, the habitat is already disturbed and fragmented. The dominant vegetation community crossed by the proposed Chacahoula ROWs is wetlands, comprising 73 percent of the affected vegetation communities. These wetlands include palustrine forested (37 percent), palustrine emergent (14 percent), and estuarine wetlands (16 percent). The wetlands transition from forested to emergent to estuarine as the pipelines transition from the storage site toward the ocean. More than 58 percent of the ROW corridor for the brine discharge pipeline follows existing canals or pipeline corridors, which are maintained and offer reduced habitat value. The wetlands in the proposed ROW protect upland areas from storm and flood surges, convert and store important ecological nutrients and nonpoint pollutants, and serve as habitat for important commercial and recreational species such as fur bears, crayfish, marine fish, and shellfish. Upland areas along the ROWs are disturbed or managed lands such as agriculture and low-density residential. Three-quarters of the upland areas are crossed by the crude oil distribution pipelines to Clovelly and St. James.

Mammals found in and around the fresh-water wetlands include otter, mink, raccoon, muskrat, and nutria. Major avian groups include waterfowl, herons, egrets, ibises, and shorebirds. Amphibians and reptiles include the American alligator, snapping turtles, red-eared turtles, water snakes, southern leopard frogs, and bullfrogs.

The estuarine emergent wetlands are a highly diverse community supporting both saltwater and fresh-water vegetation. They are tidally influenced, with most of the water receding from the vegetated area during low tides. These areas are important nurseries for juvenile species of fish, crustaceans, and other invertebrates. The vegetation provides protection and shelter from larger predators and provides food production for wildlife and aquatic organisms. Many of these species, such as shrimp, crab, oysters, trout, flounder, and redfish, are commercially important.

Special Status Species

A literature review identified that the following federally listed species may be present within the parishes where the proposed ROWs cross: bald eagle, brown pelican, peregrine falcon, piping plover, gulf sturgeon, pallid sturgeon, red wolf, and several marine mammals and sea turtles. As discussed in appendix F, the proposed pipeline ROWs would cross within 1 mile (2 kilometers) of a recorded bald eagle nest (Lester 2006). The proposed ROWs to Clovelly, St. James, and the RWI pass within 1,500 feet (460 meters) of a bald eagle nesting site.

According to USFWS, brown pelicans may roost in coastal areas crossed by the proposed Chacahoula pipeline ROWs. The brine disposal pipeline ROW and the crude oil pipeline ROW to Clovelly would pass through or near coastal areas including barrier islands, sandbars, and wetlands that provide potentially suitable habitat for the brown pelican.

Essential Fish Habitat

No EFH is located in or near the proposed Chacahoula ROWs.

Special Status Areas

There are no special status areas in or near the proposed Chacahoula ROWs.

3.7.4.1.3 Raw Water Intake and Access Road

The proposed RWI would be located on the ICW south of the project site. A 2.5-mile (3.9-kilometer) access road would be built to access the RWI from Highway 90.

Plants, Wetlands, and Wildlife

The ICW is a heavily traveled corridor that is frequently maintained for navigational depth. The RWI access road would pass through 5.6 acres (2.3 hectares) of palustrine forested wetlands and 3.3 acres (1.3 hectares) of palustrine emergent wetlands. The proposed RWI location is characterized by the same type of palustrine forested wetland community as described at the proposed storage site, although the water would be more saline. Terrestrial species would be similar to those found at the storage site. More than 130 species of fish may inhabit the ICW, including representatives from 40 families (Page and Burr 1991; Froese and Pauly 2006; Hoese and Moore 1998). These organisms are common throughout the Gulf Coast region.

Special Status Species

A literature review identified that the following federally listed species may be present within the parish where the proposed RWI and associated infrastructure would be located: bald eagle, brown pelican, peregrine falcon, piping plover, gulf sturgeon, red wolf, and several marine mammals and sea turtles. The area around the proposed RWI has been identified by the USFWS as an area with a large number of bald eagle nests (Watson 2005). Two nests are located within 1,500 feet (460 meters) of the proposed RWI site.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed RWI and access road.

Special Status Areas

There are no special status areas in or near the proposed Chacahoula RWI site.

3.7.4.1.4 Offshore Brine Disposal

Plants, Wetlands, and Wildlife

The offshore brine disposal pipeline would extend 17 miles (28 kilometers) from the shore directly south through the Gulf of Mexico. Unlike the other brine diffusion sites, which are located on relatively flat seabed, Chacahoula's brine diffusers are located next to Ship Shoal. Ship Shoal is a large, natural sand bank that is an important habitat for fish and other marine organisms.

Special Status Species

A literature review identified that the following federally listed species may be present within the parishes where the proposed offshore brine disposal pipeline and diffuser would be located: bald eagle, brown pelican, peregrine falcon, piping plover, gulf sturgeon, red wolf, and several marine mammals and sea turtles. As discussed in appendix F, DOE determined that no threatened, endangered, or candidate species would be affected by the proposed brine disposal pipeline or brine discharge.

Essential Fish Habitat

The offshore area for the proposed brine disposal pipelines would include areas that are designated EFH. The composition of managed species and type of EFH differ based on distance offshore. For nearshore, estuarine environments, the managed species include cobia, greater amberjack, king mackerel, red drum, Spanish mackerel, red grouper, gray snapper, lane snapper, red snapper, stone crab, brown shrimp, pink shrimp, and white shrimp. All of the above species are also located at the proposed offshore brine diffusion site, along with two additional species—yellowtail snapper and spiny lobster.

Special Status Areas

No special status areas are located near the proposed offshore and brine diffuser system.

3.7.4.2 Impacts

3.7.4.2.1 Chacahoula Storage Site and Access Road

Plants, Wetlands, and Wildlife

Development of the site would require clearing about 230 acres (93 hectares) of vegetation within the cypress-tupelo swamp. To support the construction of buildings, roads, well heads, and the security perimeter, about 120 acres (49 hectares) of wetlands would be filled. Construction of the access road would fill about 5.9 acres (2.4 hectares) leading to the site. Another 120 acres (49 hectares) surrounding the site would be cleared of trees and dense vegetation to establish the 300-foot (91-meter) security buffer. Areas not filled in the site boundary probably would re-establish with the dense floating vegetation found in naturally occurring openings in the cypress-tupelo swamp. DOE would place culverts in the security perimeter road to retain the hydrological regime of the wetlands.

The placement of fill in the wetlands would cause a permanent loss of wetland functions and values; however, the clearing of forested wetlands in the security buffer would represent a wetland conversion and some wetland functions would be preserved. The removal of trees and other vegetation would create a large open area in the otherwise continuous forested wetlands. Although the impact to this relatively rare and important type of forested wetland may be an adverse affect, it would be mitigated somewhat by the compensation plan for jurisdictional wetland impacts.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from the USACE. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create forested wetlands or contribute to a mitigation bank in the region to compensate for impacts to jurisdictional wetlands.

The development of the Chacahoula storage site would change wetland species composition and have long-term impacts on surrounding plant and animal communities by introducing edge habitat within a relatively large continuous flooded forested area. Generally, any displaced organisms could find sufficient habitat in the surrounding area. After the security fencing is constructed, wildlife use of the site would be limited, though some mobile species and birds would still visit the site. The operational and maintenance activities described in section 3.7.2 could affect migration of birds due to night lighting, noise, and human activity.

The fill of inundated wetland areas would temporarily increase erosion and could affect aquatic species such as fish, amphibians, and invertebrates as described in section 3.7.2. As described in chapter 2, DOE would minimize erosion by complying with permit requirements. DOE would develop an erosion-and sediment-control plan and secure a Louisiana Pollutant Discharge Elimination System stormwater permit issued by the Louisiana Department of Environmental Quality for construction activities, which would require the use of best management practices to minimize the impact to water bodies.

Mitigation: DOE would continue to refine the concept plan to avoid and minimize impacts to wetlands and comply with state and federal regulations on wetlands.

Mitigation: DOE would use low-mast, down-shielded lights to minimize the impact on migratory birds. DOE would mitigate impacts to migratory birds and sensitive species in coordination with the USFWS. If this candidate alternative is selected, DOE would conduct a survey of raptor nests and secure any necessary permits in accordance with the requirements of the Migratory Bird Treaty Act.

Special Status Species

Construction of the Chacahoula storage site would remove all trees in the 320-acre (130-hectare) site and security buffer. This would be a large area of potential nesting, roosting, and foraging habitat within 1 mile (1.6 kilometers) of a recorded bald eagle nesting area. Because of the complexity of this site and duration of construction (8 to 10 years), DOE could not avoid all construction activities during bald eagle nesting periods. DOE has determined this may affect the bald eagle. Therefore, if this site is selected, DOE would initiate formal Section 7 Consultation with USFWS and work with the Louisiana Department of Wildlife and Fisheries to avoid, minimize, or mitigate the effects to bald eagles. DOE would prepare a Biological Assessment if it was determined that the project may adversely affect the bald eagle and implement any conditions of a Biological Opinion.

Operations and maintenance activities at the site may affect the bald eagle because noise, human activities, and lights near nesting and perching sites can disturb normal behavior or render sites unsuitable for continued use by this species. DOE would use low-mast and down-shielded lights to minimize the impacts of photopollution.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed Chacahoula site.

Special Status Areas

No special status areas would be affected by the proposed Chacahoula site.

3.7.4.2.2 Chacahoula Pipeline Rights-of-Way

Plants, Wetlands, and Wildlife

Construction in the pipeline and power line ROW would result in clearing all the vegetation in the ROW. The ROWs would affect the following upland habitats:

- 4 acres (0.6 hectare) of deciduous forest,
- 490 acres (198 hectares) of disturbed or managed habitat, and
- 2 acres (0.8 hectare) of other habitat.

Using the USFWS National Wetlands Inventory maps and proposed construction easements, construction would affect the following wetland types:

- 978 acres (396 hectares) of palustrine forested wetlands,
- 371 acres (150 hectares) of palustrine emergent wetlands,
- 410 acres (166 hectares) of estuarine wetlands,
- 46 acres (19 hectares) of palustrine scrub-shrub wetlands,
- 59 acres (24 hectares) of lacustrine wetlands,
- 15 acres (6 hectares) of riverine wetlands ,
- 6 acres (2 hectares) of palustrine aquatic bed wetlands,
- 13 acres (5 hectares) of palustrine unconsolidated bottom wetlands, and
- 3 acres (1 hectare) of marine wetlands.

About 50 percent of the proposed ROW would follow existing corridors, which means habitat has already been fragmented and disturbed for a large percentage of the proposed ROW.

As discussed in section 3.7.2.1, approximately 33 to 40 percent of this footprint would be a permanent impact because it is located within the permanently maintained easement. The vegetation in the construction easement would be cleared, but DOE would regrade to preconstruction contours and reseed with native species in this area to re-establish native habitat. The area within the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be returned to preconstruction conditions and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands and the nature and amount of wetland impact from the permanent and construction easements.

If this alternative is selected, DOE would complete wetland delineations and secure a jurisdictional determination from USACE. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

The operations and maintenance impacts within the ROWS in wetlands are described in section 3.7.2, Common Impacts.

As stated in section 3.7.2, construction in the ROWs would displace or kill some aquatic and terrestrial wildlife. Noise and human activity may temporarily preclude some organisms from using nearby habitat. The duration of construction in these areas would be short (6 to 10 weeks at any one location) and ample

habitat would be available nearby for most species. The aboveground portion of the power lines to the site and RWI represents a potential strike hazard that could affect resident and migratory birds as described in section 3.7.2.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat such as wetlands or habitat for special status species. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

DOE would use low power line poles (less than 75 feet [23 meters]) and would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996).

Special Status Species

All proposed ROWs have at least one documented bald eagle nesting site within 1 mile (1.6 kilometers). The USFWS and the Louisiana Department of Wildlife and Fisheries recommend against construction activities that would occur during nesting periods (i.e., October to mid-May) within 1 mile (1.6 kilometers) of nest sites. The agencies also recommend that large trees be saved for potential roost and perch trees (Carloss 2005). During preconstruction surveys, DOE would map all bald eagle nests located within 1 mile (1.6 kilometers) of a proposed ROW. DOE would coordinate with the USFWS and Louisiana Department of Wildlife and Fisheries to avoid adverse impacts by shifting the alignment, adjusting the construction schedule, and implementing a large tree preservation plan (where practicable). Most trees within the ROW easement would be cleared, but DOE would reseed with native species in this area to re-establish native habitat.

Along the pipeline ROWs, maintenance activity would be restricted during the nesting season; therefore, operations and maintenance activities would have no effect on the bald eagle. Most of the pipelines would be built along existing ROWs and operations and maintenance of the proposed widening of the ROW would be similar to existing conditions; and therefore, they should have no effect on the bald eagle.

If nesting brown pelicans are located near the crude oil pipeline ROW to the storage facility at Clovelly, they may be affected by the construction of these ROWs. The crude oil pipeline, however, would be built along an existing ROW, which would minimize the potential for an adverse effect. Brown pelicans can be disturbed by human noise and activity nearby, especially if activity is closer than 2,300 feet (700 meters) to nests (NatureServe 2005). If brown pelican roosts or nests are identified in or near a pipeline ROW, construction would be scheduled to occur during periods when nesting is not active, if possible. Bird nests and roosts would be left undisturbed, and all activity would be restricted near them.

If any portion of the project may adversely affect the bald eagle or brown pelican, DOE would initiate formal Section 7 Consultation with the USFWS and coordinate with the Louisiana Department of Wildlife and Fisheries to develop a plan to avoid adverse impacts. A Biological Assessment would be completed by the DOE if required. DOE would implement any conditions included in the Biological Opinion.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed Chacahoula ROWs.

Special Status Areas

There are no special status areas in or near the proposed Chacahoula pipeline ROWs.

3.7.4.2.3 Raw Water Intake

Plants, Wetlands, and Wildlife

Construction of the proposed RWI would require clearing of about 1 acre (0.4 hectares) of palustrine forested wetlands at the intake site and 6 acres (2 hectares) of palustrine forested wetlands and 3 acres (1.2 hectares) of palustrine emergent wetlands for the access road. Fill would be required for the facility footprint and some construction staging areas. The footprint of the structure would occupy approximately half of the area needed for site construction. The access road would be built on pilings. DOE would restore cleared areas to preconstruction conditions and monitor them after construction. The 9 acres (3.6 hectares) of land affected by the access road would not be filled, but would lose some wetland functions because the species composition would be indirectly affected from shading of the roadway, which would be on pilings.

If this alternative is selected, DOE would secure a jurisdictional determination from USACE. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create forested and emergent wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for wetland impacts.

This area of the ICW is frequently disturbed by traffic and dredging. Although species that forage or nest in the immediate area would be tolerant of frequent human activity and noise, construction and operation of the RWI would add to this disturbance and may displace sensitive species.

The RWI would withdraw about 1.2 MMB (50 million gallons per day) from the ICW for a period of 4 to 5 years during cavern solution mining and periodically afterwards for drawdown or cavern maintenance. The ICW has a relatively stable and abundant flow of water due to the tidal influence from the Gulf of Mexico. The proposed water withdrawal would not affect the stream flow in the ICW nor diminish the minimum instream flow necessary to sustain aquatic organisms. The withdrawal could change the salinity gradient in the ICW by causing an upstream migration of more saline brackish water.

Operations and maintenance of the RWI would produce noise during cavern solution mining, for a period of 4 to 5 years, and postconstruction during periods of oil fill and drawdown. Noise may preclude sensitive terrestrial and aquatic wildlife from using habitat in the immediate vicinity of the RWI. During water withdrawal, some aquatic organisms would become entrained or impinged by the intake, especially juveniles, larval stages, and dispersed fish eggs. The RWI would be equipped with screens, an intake velocity, a traveling screen, and fish bypass that would minimize entrainment and impingement.

Section 3.7.2 provides a description of other operations and maintenance impacts including artificial lighting and increased human activity that could affect migratory birds and other wildlife.

Mitigation: As described in section 3.7.2, DOE would use down-shielded and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. As described in chapter 2, DOE would use noise attenuation measures such as a concrete enclosure for the pump station to minimize noise impacts.

Special Status Species

Data provided by the Louisiana Department of Wildlife and Fisheries indicates that bald eagle nests exist within 1,500 feet (460 meters) of the proposed RWI. The USFWS and the Louisiana Department of Wildlife and Fisheries recommend against any activity taking place within this 1,500 foot (460 meter) buffer area of an active nesting site (Carloss 2005; Watson 2005b). DOE would have a biologist survey the area to identify the exact locations of nests near the proposed RWI. Where feasible, DOE would adjust proposed locations to avoid disturbance within 1,500 feet (460 meters) of a nest tree. If nests and the recommended buffer zone cannot be avoided, DOE would initiate formal Section 7 Consultation with the USFWS, coordinate with the Louisiana Department of Wildlife and Fisheries, and prepare a Biological Assessment if required. DOE would follow all recommendations provided in the Biological Opinion from the USFWS.

DOE would enclose the raw water pump station to minimize noise impacts on wildlife including the bald eagle. Normal operations and maintenance activities at the RWI would be completed outside nesting seasons to the extent possible. Operation activities associated with a drawdown of oil and water withdrawal may happen at any time of the year, but the noise from that activity would not likely adversely affect bald eagles near the RWI.

Essential Fish Habitat

No EFH is located in or near the boundaries of the proposed Chacahoula RWI.

Special Status Areas

There are no special status areas in or near the proposed Chacahoula RWI.

3.7.4.2.4 Offshore Brine Disposal

Plants, Wetlands, and Wildlife

Section 3.7.2 describes impacts to common species found in the Gulf of Mexico from offshore pipeline construction and brine disposal.

Special Status Species

Several species of sea turtles as well as the manatee may travel through the area of the offshore pipeline and brine diffuser; however, none of these species would be adversely affected by the proposed action because they are highly mobile and relatively tolerant of salinity changes, and the brine discharge would affect only a very small portion of their habitat.

Essential Fish Habitat

Because the bottom currents are parallel to Ship Shoal, it is possible that the Chacahoula discharge plume would be constrained by the decrease in depth of 14 to 18 feet (4.3 to 5.5 meters) near the shoal. The plume is also confined due to the shallower water depth to the west. Therefore, the plume is expected to elongate and move to the north and east. Under certain oceanic conditions, the plume could move to the southeast along the Ship Shoal boundary. However, under most ocean conditions, the higher salinity concentrations would be located off the Ship Shoal area. The location of the diffusers and proximity to the shallow Ship Shoal may limit the dilution and mixing capacity of the brine discharge. The presence of the shoal could create a more concentrated brine plume that could potentially have a greater impact on species that are less tolerant of higher salinity. DOE would secure a Louisiana Pollutant Discharge Elimination System permit for the discharge from the Louisiana Department of Environmental Quality, which would establish discharge limits that protect water quality and aquatic resources. Given the relatively limited size of the salinity plumes and the salinity tolerances of most organisms, the overall impacts to mobile, commercially valuable species are expected to be relatively small.

Mitigation: DOE would evaluate the mixing capacity of the brine discharge during the application process for a Louisiana Pollutant Discharge Elimination System permit. During the LPDES permit process, DOE would model the discharge using EPA's CORMIX discharge model to better refine the design and location of the diffusers. The design and orientation of the diffusers could be modified to ensure that mixing and dilution are maximized. DOE has already modified the original orientation of the brine diffusers so that they form an east-west line. This modification was designed to enhance the mixing of the discharge and minimize the potential for impacting the ship shoal fisheries. DOE would coordinate with the Louisiana Department of Environmental Quality, NOAA Fisheries, USACE, and U.S. Coast Guard to ensure that navigation, recreational fisheries, managed fisheries, and marine organisms are not impacted adversely by the brine disposal pipeline and discharge.

Special Status Areas

There are no special status areas located in or near the offshore brine diffusion system.

3.7.5 Clovelly Storage Site

This discussion addresses the following areas:

- The Clovelly storage site, including administrative buildings, piperacks, and security fencing; and
- New onsite RWI system and access road.

The proposed storage site at Clovelly would not require construction for the brine disposal or oil distribution systems. DOE would use LOOP's current facilities for the brine disposal and oil distribution. Brine disposal during cavern development and draw down would use the existing brine reservoir and offshore disposal system within currently permitted limits. Because of the similarity among the proposed SPR facilities in offshore environment and operations and maintenance of the brine diffuser, the discussion of the brine diffusion system for all proposed storage facilities is covered in section 3.7.2 and appendix E. Also due to the similarities among the proposed storage sites, the discussion of EFH is contained in section 3.7.2 and appendix E.

3.7.5.1 Affected Environment

3.7.5.1.1 Clovelly Storage Site

Plants, Wetlands, and Wildlife

The proposed Clovelly storage site would be developed at the existing LOOP Clovelly dome storage terminal in southeastern Louisiana within the Outer Coastal Plain Forest Province (Bailey 1995). The proposed storage site encompasses portions of the Barataria Bay estuary between the Mississippi River and Bayou Lafourche. The principal habitats include bayous, fresh to saline marshes (estuarine emergent wetlands), and **cheniers**, which are water-deposited and wind-driven depositional features associated with high-water marks. Although this area was west of the Hurricane Katrina path, it was flooded during the event. The immediate area at the Clovelly site did not experience adverse impacts to biological resources.

The site consists of maintained open-water canals for access to LOOP storage caverns among vegetated dredge spoil piles. The canals are devoid of submerged aquatic vegetation because the water is too deep, too turbid, and maintained. The former dredge spoil piles are in various stages of revegetation and include the following species: spikerush, arrowhead, cordgrass, wiregrass, roseau cane, deer pea, and water hyssop. Upland portions of the spoil piles support tree species such as red maple and Chinese tallowtree, which would otherwise not be expected to grow in the low-lying and saline wetland environment. The aquatic environment is influenced by a daily tidal influence. Depending on the season, waterfowl, wading birds, marsh hawks, alligators, and fur-bearing mammals are commonly found at the proposed storage site.

The area is predominately an estuarine community. The estuarine finfish species expected to inhabit the site include saltwater catfishes, drums, croakers, killifish, and jacks. Fresh-water species that may be present include fresh-water catfishes, sunfishes, and mullets. Invertebrate species common in these estuarine systems include stone crab, blue crab, oysters, and shrimp.

The administration buildings would be constructed about 4 miles (6 kilometers) to the west of the storage caverns across the road from LOOP administrative facilities. The land is disturbed from frequent activity along the road and nearby agriculture.

Special Status Species

A literature review identified that the following federally listed species may be present within the parish where the proposed Clovelly storage site would be located: bald eagle, brown pelican, peregrine falcon, piping plover, the gulf sturgeon, and several marine mammals and sea turtles. However, after consultations with USFWS and the Louisiana Department of Wildlife and Fisheries, DOE determined that the proposed Clovelly storage site would not affect federal or state-listed threatened, endangered, or candidate species.

Essential Fish Habitat

No EFH is located in or near the proposed Clovelly storage site.

Special Status Areas

The Gulf ICW to Clovelly Hydrologic Restoration project area (Coastal Wetlands Planning, Protection and Restoration Act, Project Number BA 2) is located immediately to the north of the LOOP facility. It is

a wetland protection, restoration, and enhancement project involving about 60,000 acres (24,000 hectares) of fresh and brackish wetlands. The project was completed in 2002, but continues to be monitored.

3.7.5.1.2 Raw Water Intake

Plants, Wetlands, and Wildlife

The proposed RWI site would be located at the existing LOOP facility on a platform adjacent to an open-water canal. The RWI would be located a few hundred meters southwest of the storage caverns. Emergent wetland is the dominant vegetation classification in the area of the proposed RWI. The plants, wetlands, and wildlife are described in detail in the Clovelly storage site description.

Special Status Species

The RWI would be located in the same general location as the storage caverns. DOE has determined this area would not affect federal or state-listed threatened, endangered, or candidate species.

Essential Fish Habitat

No EFH is located in or near the proposed Clovelly storage site.

Special Status Areas

The special status area that may be affected by the proposed RWI is described above in the discussion of the affected environment for the proposed Clovelly storage site.

3.7.5.2 Impacts

3.7.5.2.1 Clovelly Storage Site

Plants, Wetlands, and Wildlife

The proposed facility would have a small footprint and cause minimal disturbance to plant communities, open-water canals, estuarine wetlands, and dredge spoil sites. To construct the proposed caverns, about 8 acres (3 hectares) of estuarine wetlands would be dredged to allow access for drill barges. About 1 acres (0.4 hectares) of estuarine wetlands and canal would be filled. All of this land is comprised of dredge spoil piles from previous LOOP construction activities. Although used by some bird species for nesting and foraging, the spoil areas are poor quality habitat due to previous disturbance and the presence of invasive species such as Chinese tallowtree. The spoil piles are elevated above the water level and support trees and upland species that otherwise would not grow in the estuarine open-water habitat. The dredged material would be temporarily placed on an upland area at the south side of the LOOP facility. Removal of the vegetation from the dredge spoil areas would displace some birds and other animals to adjacent habitat. This impact may disrupt individuals, but it would not alter the overall population or species viability. The Coastal Wetlands Planning, Protection, and Restoration Act project to the north provides about 60,000 acres (24,000 hectares) of high quality habitat near the site; therefore, there should be adequate and suitable habitat located nearby for displaced species.

DOE would conduct most of the cavern solution mining from drill barges. At the seven caverns where dredging is not needed, drilling would disturb plant communities in previously disturbed areas. Fish and other mobile species could move to adjacent undisturbed areas during construction. Drilling activities would increase suspended sediments in a localized area around the cavern sites. The erosion and

sediment control plans and a Louisiana Pollutant Discharge Elimination System stormwater permit for construction activities would require best management practices to minimize siltation and sedimentation.

The piperacks to the cavern areas would be erected on pilings above the estuarine emergent wetlands and open water. Wetlands located underneath would be indirectly affected due to shading. Some vegetation directly under these areas would die, while vegetation near the edges may receive sufficient light to survive. The platforms are typically made of open mesh metal elevated several feet above the water. Some sunlight would penetrate through the platform to the wetlands and open water below. These affected areas are revegetated spoil piles that provide marginal habitat to bird and other species.

DOE's administration buildings would be located in an upland area about 4 miles (6 kilometers) from the caverns along East 103 Street and on the north side of the existing LOOP buildings. Construction of these buildings would impact about 0.1 acres (0.04 hectares) of upland forest and 0.2 acres (0.08 hectares) of maintained grass. No wetlands would be affected. This area has been previously disturbed and is frequently disturbed by mowing and other human activities along the access road.

The LOOP facility currently operates as an oil storage facility. The construction and operation of an additional 16 caverns and related facilities for the proposed SPR site would not alter day-to-day operations in the long-term. Areas dredged for access during construction would be maintained at depths to allow for navigation by service boats. This activity would temporarily disturb some aquatic species in the area.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from the USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and preserve onsite emergent wetlands to the maximum extent practicable. The footprint of fill into open-water canals and wetlands would be small because the infrastructure would be placed on an elevated platform that is supported by pilings. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid and minimize and compensate for impacts to jurisdictional wetlands. In addition, a Section 10 permit from the U.S. Coast Guard may be needed for the proposed filling of the mouth of a canal if it is determined to be navigable waters. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the 404 permit and 401 Water Quality Certificate from the USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with permit conditions.

Mitigation: The spoil would be disposed of in an upland area, used to create or restore estuarine wetlands within the LOOP facility, or donated to nearby marsh (emergent wetland) restoration areas.

Mitigation: DOE would implement a plan to control Chinese tallowtree invasion on the site. DOE would control invasive species by using seed mixes devoid of exotic and invasive species and through postconstruction monitoring of the disturbed areas. If the monitoring detected problems with invasive species, DOE would implement corrective action.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetlands impacts and impacts to forests.

Special Status Species

DOE has determined that no federal or state-listed threatened, endangered, or candidate species would be affected at the Clovelly storage site.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed site.

Special Status Areas

The proposed action at Clovelly is contained entirely within the current LOOP boundaries, and operation would be consistent with current activity. DOE does not expect any effect on the Gulf ICW to the Clovelly Hydrologic Restoration project area.

3.7.5.2.2 Raw Water Intake

Plants, Wetlands, and Wildlife

Section 3.7.2 describes general information about construction impacts associated with the proposed RWI structure. The proposed RWI would have a small footprint and cause minimal disturbance to plant communities, open-water canals, estuarine wetlands, and dredge spoil sites. To construct the proposed RWI and access road extension, about 1 acre (0.4 hectares) of wetlands, according to National Wetlands Inventory data, would be affected by dredging and construction of the platform. The existing access road would be extended about 300 feet (91 meters) to the proposed intake structure.

As discussed in section 3.7.2, some wildlife species would be displaced to similar vegetative and wetland communities surrounding the RWI. Dredging required for construction of the RWI structure may affect some aquatic organisms and temporarily increase suspended sediment in the water column. Mobile species could move away from the construction area. The canals in this area are dredged and maintained regularly. Therefore, most aquatic species would be tolerant of noise and human activity.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from the USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and waters to the maximum extent practicable. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in Common Impacts (see section 3.7.2) and in accordance with the 404 permit and 401 Water Quality Certificate from the USACE and the Louisiana Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the wetland impacts. As presented in chapter 2, erosion would be minimized with the use of best management practices. An erosion and sediment control plan and NPDES stormwater permit issued by the Louisiana Department of Environmental Quality for construction activities would be secured, which would require the use of best management practices to minimize the impact to water bodies.

Operations and maintenance of the RWI structure would produce noise during cavern solution mining (4 to 5 years) and periods of fill and drawdown. Noise may preclude sensitive terrestrial and aquatic wildlife from using habitat in the immediate vicinity of the RWI structure. Section 3.7.2 describes other operations and maintenance impacts, including artificial lighting and increased human activity, that could affect migratory birds and other wildlife.

The operation of the RWI would require up to 1.1 MMBD (46 million gallons per day) of water for a period of 4 to 5 years for cavern solution mining, which would be drawn from a tidally influenced canal. Periodically afterwards, water would be drawdown or cavern maintenance. Because LOOP uses a large brine pond for day-to-day operations, drawdown of 4 MMBD (170 million gallons per day) or less would use the existing brine reservoir. The entire region around the site is interspersed with a complex system of interconnected canals that extend to the Gulf of Mexico. Because of the tidal influence and extensive system of interconnected canals, the withdrawal would not impact water levels or the hydrology of the surrounding wetlands. During water withdrawal activities and operation of the RWI, some small aquatic organisms could become entrained or entrapped on the intake—especially larval stages, juveniles, and dispersed fish eggs as described in section 3.7.2. The potential for entrainment and impingement would be minimized by equipping the RWI with appropriate screen diameter, intake velocities, and traveling screens equipped with a fish bypass to collect and return aquatic life to the canals.

Mitigation: As described in section 3.7.2, DOE would use down-shielded and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. As described in chapter 2, DOE would use noise attenuation measures such as a concrete enclosure for the pump station to minimize noise impacts.

Special Status Species

DOE has determined the construction, operations and/or maintenance of the RWI would not affect special status species (see appendices F and I).

Essential Fish Habitat

No EFH exists within or near the boundaries of the proposed RWI and no impact to EFH would occur.

Special Status Areas

DOE does not expect any effect on the Gulf ICW to Clovelly Hydrologic Restoration project area.

3.7.6 Clovelly and Bruinsburg Storage Sites

This section addresses the following areas:

- The proposed Clovelly 80 MMB and Bruinsburg 80 MMB alternative (160 MMB total), the proposed Clovelly 90 MMB and Bruinsburg 80 MMB alternative (170 MMB total) and their associated facilities;
- The proposed pipeline and power line ROW segments;
- The proposed RWI structures at Clovelly and Bruinsburg including site access roads;
- The proposed petroleum storage terminal in Jackson; and
- The 30 offsite brine injection wells.

Section 2.4.4 describes the proposed action for the joint development of the Clovelly and Bruinsburg storage sites. Most components of the proposed action and the potentially affected areas for the development of the Clovelly and Bruinsburg storage alternative would be similar to the analysis provided

in sections 3.7.3 and 3.7.5. This section on the Clovelly-Bruinsburg alternative focuses on the elements of the proposed action and their associated biological impacts that would be different from the development of the alternatives as individual storage sites. These differences include smaller site footprints for the proposed infrastructure and changes in crude oil pipeline distribution routes.

The Clovelly 90 MMB and Bruinsburg 80 MMB alternative (see chapter 2) was addressed as well. The only difference from the Clovelly 90 MMB and Bruinsburg 80 MMB alternative is that the RWI withdrawal and the brine discharge would occur over a slightly longer time frame during cavern construction. Because the footprint for the Clovelly 80 MMB or Clovelly 90 MMB layout would not be different and the impacts would not be substantially different, DOE did not specifically describe the impacts of the Clovelly 90 MMB-Bruinsburg 80 MMB alternative. Thus, all the discussion below is related to the Clovelly 80 MMB and Bruinsburg 80 MMB alternative but also applies to the Clovelly 90 MMB and Bruinsburg 80 MMB alternative.

3.7.6.1 Affected Environment

3.7.6.1.1 Clovelly and Bruinsburg Storage Sites

Plants, Wetlands, and Wildlife

The proposed Clovelly 80 MMB storage site would be developed at the existing LOOP Clovelly Dome storage terminal in southeastern Louisiana within the Outer Coastal Plain Forest Province (Bailey 1995). The affected environment for the proposed Clovelly storage site is described in detail in section 3.7.5. The Clovelly 80 MMB storage site would be slightly smaller than the 120 MMB proposed site with 4 less caverns. Consequently, with the smaller footprint, the 80 MMB storage configuration would require less dredging and connecting pipeline.

The proposed Bruinsburg 80 MMB storage site would occupy about 254 acres (103 hectares) at a site located about 10 miles west of Port Gibson, MS (see figure 2.4.4-2). This area includes about a 172-acre (69-hectare) storage site with a 300-foot (91-meter) security buffer around the facility. The facility would also have an access road that would occupy about 2.3 acres (0.8 hectares). The affected environment for the proposed Bruinsburg storage site is described in detail in section 3.7.3.

Special Status Species

Special status species for the proposed Clovelly and Bruinsburg storage sites are described in sections 3.7.3 and 3.7.5, respectively.

Essential Fish Habitat

EFH for the proposed Clovelly and Bruinsburg storage sites are described in sections 3.7.3 and 3.7.5, respectively.

Special Status Areas

Special status areas for the proposed Clovelly and Bruinsburg storage sites are described in sections 3.7.3 and 3.7.5, respectively.

3.7.6.1.2 Clovelly and Bruinsburg Rights-of-Way

Four pipeline and five power line ROWs would be required for the proposed Bruinsburg storage site (see figure 2.4.1-1). This affected environment section discusses the pipeline and power line ROWs that are different from the proposed Bruinsburg 160 MMB storage site (section 3.7.3). The impacts discussion in section 3.7.6.2.2 considers the impact of all pipeline and power line ROWs associated with the proposed Clovelly-Bruinsburg alternative.

The proposed RWI pipeline ROW, RWI power line ROW, and site power line ROW would be the same under the 80 MMB and 160 MMB Bruinsburg storage site alternatives. The 8-mile (13-kilometer) brine-disposal ROW, including the pipeline, power line, and access road, would be half the length of the brine disposal ROW proposed under the 160 MMB option. The brine disposal pipeline would only need to support 30 brine injection wells rather than 60 wells. The proposed crude oil distribution pipelines would differ from the 160 MMB site alternative in that they would go north and northwest and end at different petroleum storage terminals located near the Cities of Jackson and Vicksburg, MS.

No offsite pipelines or power lines would be necessary for the proposed Clovelly storage site.

Pipeline ROWs

- A proposed 54.4-mile (87.5-kilometer) crude oil pipeline would be constructed from the Bruinsburg site to the Jackson terminal. The pipeline would share an ROW with the crude oil pipeline to the Vicksburg terminal for 19.0 miles (30.6 kilometers). A 138-kilovolt power line would exit the site and share an ROW with the crude oil pipelines for 5.7 miles (8.8 kilometers). Approximately 30 miles (50 kilometers) of the pipeline ROW would follow existing power line corridors.
- A proposed 31.8-mile (52.1-kilometer) crude oil pipeline would be constructed from the Bruinsburg site to the Vicksburg terminal. The proposed pipeline would share an ROW with the crude oil pipeline to the Jackson terminal for 19.0 miles (30.6 kilometers). A 138-kilovolt power line would exit the site and share an ROW with the crude oil pipelines for 5.7 miles (8.8 kilometers). Approximately 20 miles (30 kilometers) of the pipeline ROW would follow existing power line corridors.

Plants, Wetlands, and Wildlife

Nearly 60 percent of the 19.0 miles (30.6 kilometers) of the shared crude oil pipeline ROW from the proposed Bruinsburg storage site contains deciduous forest. Approximately 70 percent of the deciduous forest contains palustrine forested wetlands. The remainder of the ROW consists of evergreen forest, grassland and scrub-shrub habitat, and disturbed or managed lands.

The crude oil pipeline to the Jackson terminal continues for 35.3 miles (56.8 kilometers) to the Vicksburg terminal after splitting from the shared ROW with the crude oil distribution pipeline. Approximately 39 percent of the ROW traverses grassland and scrub-shrub habitat. A large portion of this habitat is likely successional growth from abandoned agricultural fields or pine plantations. The remaining habitat within the ROW is comprised of deciduous forest and disturbed or managed lands. Approximately 26 percent of the total ROW area is identified as palustrine forested wetlands by the National Wetlands Inventory data.

The crude oil pipeline to the Vicksburg terminal would extend for 12.8 miles (20.6 kilometers) after splitting from the shared ROW with the crude oil distribution pipeline to the Jackson terminal. Approximately 44 percent of the ROW is comprised of grassland and scrub-shrub habitat and disturbed or

managed lands. The remainder of the habitat is classified as a mixture of hardwood forest and wetlands habitat. The USFWS National Wetlands Inventory data classify 12 percent of the total ROW area as palustrine forested wetlands. An additional 7 percent of the total ROW area is identified as emergent and lacustrine wetlands.

Based on the various land classification types and the wetlands present along the ROWs, several common mammals, birds, amphibians, and reptiles may use the existing habitats within the ROWs. Such species would be similar to those described under the proposed Bruinsburg storage site.

Special Status Species

A literature review indicated that the following federally listed species may be present within the counties where the proposed Bruinsburg ROWs would be located: bald eagle, interior least tern, bayou darter, gulf sturgeon, pallid sturgeon, Louisiana black bear, and ringed map turtle. However, a review of the conditions along the ROWs and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that there are no federally listed threatened, endangered, or candidate species within 2 miles (3 kilometers) of the proposed crude oil pipeline ROWs to Vicksburg and Jackson.

Appendix I identifies species listed as threatened or endangered by Mississippi (but are not on the federal list) in the counties in the proposed Bruinsburg site and related infrastructure. Data provided by the Mississippi Natural Heritage Program indicated that 4 species are located within 2 miles (3 kilometers) of the proposed ROWs: bayou darter, crystal darter in Bayou Pierre, pyramid pigtoe, and rabbitsfoot in Big Black River.

Special Status Areas

The crude oil pipeline ROW to the Jackson terminal would cross through the Natchez Trace Parkway, a 440-mile (710-kilometer) highway managed by the Park Service, created to commemorate an ancient trail that connected portions of the Mississippi River to salt licks located in central Tennessee. The crude oil pipeline would connect with an existing power line corridor before entering the park boundaries and would follow that corridor through the park.

3.7.6.1.3 Clovelly and Bruinsburg Raw Water Intake Structures

The proposed Bruinsburg RWI for the 80 MMB facility would be located on the Mississippi River at the same site, but would have a smaller site footprint than the 160-MMB alternative. Access to the facility would be available from an existing road; therefore, an additional access road would not be required. The affected environment for the structure is described in section 3.7.3.1.3.

The proposed Clovelly RWI for the 80 MMB and 90 MMB facility would be located on the existing LOOP Clovelly Dome Storage on an open-water canal. The proposed RWI would have a similar site footprint as the Clovelly 120 MMB alternative. The affected environment for the proposed structure is described in section 3.7.5.1.2.

Plants, Wetlands, and Wildlife

A description of the plants, wetlands, and wildlife for the proposed Clovelly and Bruinsburg RWI is provided in sections 3.7.3 and 3.7.5, respectively.

Special Status Species

Special status species for the proposed Clovelly and Bruinsburg RWIs are described in sections 3.7.3 and 3.7.5, respectively.

Special Status Areas

Special status areas for the proposed Clovelly and Bruinsburg RWIs are described in sections 3.7.3 and 3.7.5, respectively.

Essential Fish Habitat

No EFH occurs in or near the boundaries of the RWI structure.

3.7.6.1.4 Jackson Terminal

Plants, Wetlands, and Wildlife

The proposed 71-acre (29-hectare) terminal would be located northwest of Raymond, MS, adjacent to the existing Jackson pump station for the Capline pipeline. More than 50 percent of the proposed site consists of grassland and open field habitat. Drainage ditches are present, suggesting that the grassland areas are likely converted farm fields with the ditches likely dug to drain the site. Deciduous and evergreen pine forest and agricultural fields comprise the remainder of the proposed facility. The National Wetlands Inventory data identified 9.7 acres (3.9 hectares) of palustrine forested wetlands on the site.

The surrounding area is a similar mosaic of forested and open field habitat. Wildlife using the forests and fields would be common species that are tolerant of human activities. The site provides low to moderate habitat.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Jackson terminal would be located: bayou darter, gulf sturgeon, Louisiana black bear, and ringed map turtle. However, a review of conditions at the proposed Jackson terminal and consultations with the USFWS and Mississippi Natural Heritage Program revealed that the terminal would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

No special status areas are located in or near the boundaries of the proposed terminal.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed Jackson terminal.

3.7.6.1.5 Brine Injection Wells

Thirty brine injection wells, each occupying an area of about 1.2 acres (0.5 hectares), would be located adjacent to the pipeline and power line ROW.

Plants, Wetlands, and Wildlife

The plants, wetlands, and wildlife potentially affected by the proposed brine injection wells for the Clovelly and Bruinsburg alternative are similar to what is described in section 3.7.3.2.6. The entire footprint of the brine injection wells would comprise half the size of the Bruinsburg 160 MMB alternative.

Special Status Species

A review of the conditions at the brine injection wells and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the area does not provide suitable habitat for any federally or state-listed threatened or endangered species (see appendices G and I).

Special Status Areas

No special status areas are located in or near the boundaries of the proposed brine injection wells.

3.7.6.2 Impacts

3.7.6.2.1 Clovelly and Bruinsburg Storage Sites

The impacts due to construction and operations and maintenance for the proposed Clovelly storage site are described in detail in section 3.7.5.

Plants, Wetlands, and Wildlife

The proposed Clovelly 80 MMB facility would have a smaller footprint than the proposed Clovelly 120 MMB facility and would cause only minimal disturbance to plant communities, open-water canals, estuarine wetlands, and dredge spoil sites. To construct the proposed caverns, about 3 acres (1 hectare) of estuarine wetlands would be dredged to allow access for drill barges. These wetlands are associated with dredge spoil piles from previous activities at the existing LOOP Clovelly storage facility. DOE would dredge 5 acres (2 hectares) less wetlands habitat than the proposed 120 MMB alternative described in section 3.7.1.2. No wetlands or portions of the canal would require filling under either the 80 MMB or 90 MMB facility at Clovelly. Construction, operations, and maintenance impacts related to wildlife and plant communities are described further in section 3.7.5.

The clearing and grading associated with the Bruinsburg 80 MMB storage site would affect about 254 acres (103 hectares) and include the 83-acre (33-hectare) storage site with a 300-foot (91-meter) cleared security buffer zone. An additional 2.3 acres (0.8 hectares) would be cleared to construct an access road to the Bruinsburg storage site.

The construction would affect the following habitats:

- 119 acres (48 hectares) of hardwood forest,
- 60 acres (24 hectares) of disturbed or managed land,
- 38 acres (15 hectares) of grassland and scrub-shrub habitat, and
- 36 acres (15 hectares) of palustrine-forested wetlands.

Clearing and grading the palustrine-forested wetlands would permanently fill 20 acres (8 hectares) onsite and convert 16 acres (6 hectares) within the security buffer to emergent wetlands or open water.

The construction, operations, and maintenance impacts associated with the Bruinsburg 80 MMB alternative are similar to the impacts described for the proposed 160 MMB alternative (section 3.7.3.2.1).

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts and would comply with relevant state and federal regulations on wetlands.

Mitigation: As described in section 3.7.2 DOE would use down-shielded lights and use low-mast lighting to minimize the impacts of artificial lighting on migratory birds and other wildlife. If this alternative is selected, DOE would conduct a survey for raptor nests in accordance with USFWS requirements under the Migratory Bird Treaty Act.

Mitigation: DOE would implement a plan to control Chinese tallowtree invasion on the site. DOE would control invasive species by using seed mixes devoid of exotic and invasive species and through postconstruction monitoring of the disturbed areas. If the monitoring detected problems with invasive species, DOE would implement corrective action.

Special Status Species

Special status species for the proposed Clovelly and Bruinsburg storage sites are described in sections 3.7.3 and 3.7.5 respectively.

Special Status Areas

No special status areas are in or near the boundaries of the proposed site.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed site.

3.7.6.2.2 Bruinsburg Rights-of-Way

The proposed Clovelly storage site would not require offsite pipelines or power lines. Thus, this section evaluates the impacts of all pipelines and power line ROWs associated with the proposed Bruinsburg 80 MMB storage site.

Plants, Wetlands, and Wildlife

Construction in the pipeline and power line ROWs would result in clearing all the vegetation within the ROW. Clearing the ROWs would affect the following habitats:

- 80 acres (32 hectares) of evergreen (pine) forest,
- 546 acres (221 hectares) of hardwood forest,
- 261 acres (106 hectares) of grassland and scrub-shrub habitat,
- 176 acres (71 hectares) of disturbed or managed areas, and
- 114 acres (46 hectares) of water and emergent wetlands.

GAP Analysis Program data do not accurately classify wetland areas, particularly forested wetlands (USGS 2003). DOE used National Wetlands Inventory data to determine that the proposed ROWs would affect the following wetland types:

- 408 acres (165 hectares) of palustrine forested wetlands,
- 12 acres (5 hectares) of lacustrine,
- 5 acres (2 hectares) of palustrine emergent,
- 8 acres (3 hectares) of riverine wetlands,
- 20 acres (8 hectares) of other wetlands categories,
- 1 acre (0.4 hectare) of palustrine-aquatic bed,
- 4 acres (2 hectares) of palustrine scrub-shrub,
- 3 acres (1 hectare) of palustrine open water, and
- 6 acres (2 hectares) of palustrine unconsolidated bottom.

Approximately 87 percent of the proposed Bruinsburg ROW would follow existing pipeline and utility corridors, which already have fragmented and disturbed plant communities.

The proposed pipeline and power line corridors would permanently affect about 33 to 40 percent of the described impact areas because only a 50-foot (15-meter) wide easement per pipeline would be permanently maintained. The vegetation in the construction easement would be cleared, but DOE would regrade to preconstruction contours and reseed with native species in this area to re-establish native habitat. The remaining area in the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be regraded and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands and the nature and amount of wetland impact from the permanent and construction easements. In addition, many of these wetlands would be avoided by directional drilling from the adjacent uplands. Moreover, about 25 percent of the pipeline ROWs is within or parallel to an existing ROW. Use of existing ROW corridors to the maximum extent practicable would minimize the impact to undisturbed communities and wildlife.

DOE would preserve, restore, or create wetlands in accordance with the Section 404/401 permit conditions, which would mitigate for the wetland habitat lost due to construction and operation of the site.

As stated in the section 3.7.2, construction in the ROWs would displace or kill aquatic and terrestrial wildlife. Noise and human activity may temporarily preclude some organisms from using nearby habitat. The duration of construction through these areas would be short (6 to 10 weeks at any one location) and ample habitat would be available nearby for most species. The elevated portion of the power lines could represent a potential strike hazard to resident and migratory birds. However, the maximum pole height is expected to be 75 feet (23 meters), which would greatly reduce the hazard. These impacts may affect individual organisms, but would not alter the regional population or species viability.

Common impacts associated with the operations and maintenance of the ROWs are described in section 3.7.2.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with

erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

DOE would use low power line poles (less than 75 feet [23 meters]) and follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996).

Special Status Species

The proposed ROWs would not affect any federally listed threatened, endangered, or candidate species (see appendix G). Because the brine disposal ROW and access road would not cross Coles Creek as it does in the Bruinsburg 160 MMB option there would be no impact to the federally listed endangered fat pocketbook mussel.

Bayou Pierre and Big Black River would be directionally drilled to avoid impacts to the state-listed species associated with these rivers.

Special Status Areas

The crude oil pipeline to the Jackson terminal would cross the Natchez Trace Parkway in an existing utility ROW. Construction through this area would require an expansion of the existing ROW and the clearing of additional vegetation. Trees would not be allowed to regrow within the 50-foot (15-meter) maintained easement of the pipeline; however, the remaining area affected by construction would be allowed to revegetate to natural habitat. Use of existing ROW corridors to the maximum extent practicable would minimize the impact to undisturbed communities and wildlife.

Mitigation: If the Bruinsburg site is selected, DOE would coordinate with the National Park Service to obtain the proper ROW easements through Natchez Trace Parkway. DOE would follow the existing power line easement to minimize impacts to the Parkway. DOE would work with the National Park Service to ensure that wildlife and natural resources are disturbed to the smallest degree practicable.

Essential Fish Habitat

No EFH exists in or near the pipeline and power line ROWs.

3.7.6.2.3 Raw Water Intake

Section 3.7.5.2.2 describes the construction, operations, and maintenance impacts of the proposed Clovelly RWI structure. The sections below describe the construction, operations, and maintenance impacts of the Bruinsburg RWI structure because they would be slightly different from the Bruinsburg 160 MMB storage site.

Plants, Wetlands, and Wildlife

Section 3.7.2 describes construction impacts associated with the proposed RWI structure and access roads. The clearing and grading associated with construction of the Bruinsburg RWI would affect 0.2 acres (0.1 hectare) of forested and wetland habitat. The permanent site structure would occupy only about 0.3 acres (0.1 hectare). DOE would secure permits from the USACE and the Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and would provide compensation for the unavoidable impacts.

The impacts associated with the Bruinsburg RWI are discussed in further detail in section 3.7.1.2.3.

Mitigation: As described in section 3.7.2, DOE would use down-shielded and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. As described in chapter 2, DOE would use noise attenuation measures such as a concrete enclosure for the pump station to minimize noise impacts.

Special Status Species

Special status species for the proposed Clovelly and Bruinsburg storage sites are described in sections 3.7.3 and 3.7.5, respectively.

Essential Fish Habitat

No EFH is located in or near the proposed RWI boundaries.

Special Status Areas

No special status areas are located in or near the proposed RWI boundaries.

3.7.6.2.4 Jackson Terminal

Plants, Wildlife, and Wetlands

The clearing, grading, and construction of the proposed tank farm associated with the Jackson terminal would affect about 71 acres (28 hectares) of the following areas:

- 4 acres (2 hectares) of evergreen (pine) forest,
- 20 acres (8 hectares) of deciduous forest,
- 38 acres (16 hectares) of grassland scrub-shrub habitat, and
- 8 acres (3 hectares) of disturbed or managed land.

Approximately 10 acres (4 hectares) of palustrine forested and 1 acre (0.4 hectares) of palustrine unconsolidated bottom wetlands would be filled. The placement of fill in the wetlands would cause a permanent loss of wetlands functions and values. DOE would secure permits from the USACE and the Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail.

After the security fencing is constructed, wildlife use of the site would be limited; though some mobile species and birds would probably still visit the site. The operations and maintenance activities, which are described in section 3.7.2, may preclude wildlife sensitive to human disturbance from entering the area. The operational and maintenance activities at the terminal would be infrequent and similar to activities occurring at the oil pump station adjacent to the proposed terminal. This area has already been disturbed by past construction and habitat fragmentation.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts and impacts to forests.

Special Status Species

A review of conditions at the proposed Jackson terminal and consultations with the USFWS and Mississippi Natural Heritage Program revealed that the terminal would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

No special status areas are located near or within the boundaries of the proposed Jackson terminal.

Essential Fish Habitat

No EFH exists in or near the boundaries of the proposed Jackson terminal.

3.7.6.2.5 Offsite Brine Injection Wells and Brine Disposal Pipeline and Power line ROW

Plants, Wetlands, and Wildlife

Construction of the brine injection wells would result in clearing all vegetation in the well sites. The following habitats would be affected according to Mississippi GAP Analysis Program data (USGS 2003):

- 23 acres (9 hectares) of deciduous forest,
- 2 acres (1 hectare) of grassland and scrub-shrub habitat,
- 6 acres (3 hectares) of disturbed or managed habitat, and
- 5 acres (2 hectares) of water and emergent wetlands.

Because GAP Analysis Program data does not accurately classify wetland areas, particularly forested wetlands, DOE used National Wetlands Inventory data and the proposed construction easements to determine that construction of the brine injection wells would affect 12 acres (5 hectares) of palustrine forested wetlands. The placement of fill in the wetlands would cause a permanent loss of wetland functions and values. DOE would secure permits from the USACE and the Mississippi Department of Environmental Quality for the impact on jurisdictional wetlands and provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail.

The impacts associated with the Bruinsburg brine injection wells are discussed in further detail in section 3.7.3.1.6.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize impacts to wetlands and forests.

Special Status Species

No federally listed threatened, endangered, or candidate species would be affected by the construction or operations and maintenance of the proposed brine injection wells for the Bruinsburg site (see appendix G).

No state-listed threatened or endangered species would be affected by the construction, operations, and maintenance of the proposed brine injection wells for the Bruinsburg site (see appendix I).

Special Status Areas

No special status areas exist in or near the brine disposal pipeline, power lines, and brine injection wells.

Essential Fish Habitat

No EFH exists in or near the brine disposal pipeline, power lines, and brine injection wells.

3.7.7 Richton Storage Site

This section addresses the following areas:

- Storage site and site access road;
- Five proposed ROW segments: an ROW that contains all the pipelines and power lines leaving the proposed new site, a crude oil pipeline ROW to Liberty Station, a crude oil pipeline and a brine disposal pipeline ROW to Pascagoula, a raw water pipeline and power line to the RWI structure, and power line ROW from the RWI to existing lines south of the Leaf River;
- RWI structure and access road;
- Terminal in Pascagoula, MS; and
- Terminal in Liberty, MS.

Because of the similarity among the proposed SPR facilities in offshore environment, offshore pipeline construction methods, and operations and maintenance of the brine diffuser, the discussion of the offshore pipeline and brine diffusion system for the Richton proposed storage facilities is covered in section 3.7.2. In addition, due to these similarities among the proposed storage sites, the discussion of EFH is contained in section 3.7.2 and appendix E.

3.7.7.1 Affected Environment

3.7.7.1.1 Richton Storage Site and Access Road

Plants, Wetlands, and Wildlife

The proposed Richton storage site is located in a transition area between the Outer Coastal Plain Forest Province and the Southeastern Mixed Forest Province (Bailey 1995). The ecological characteristics of the site and surrounding area represent the general characteristics of the Southeastern Mixed Forest Province, which is comprised of mixed deciduous and evergreen forests.

The proposed site encompasses about 346 acres (140 hectares) and is located north of Highway 42. This area includes the approximately 238-acre (96-hectare) storage site with a 109-acre, 300-foot (44-hectare, 91-meter) security buffer. The site is an actively managed slash pine plantation stands from 10 to 20 years of age. Some areas of the site have been harvested within the last 5 years and are at various stages of regrowth. During DOE's site visit in October 2005, trees were being harvested. The most recently logged areas are devoid of vegetation and covered in dried and rotting woody material. Older logged areas are revegetated with various herbaceous plants, grasses, bushes, and tree saplings such as blackberry, trumpet creeper, thistle, goldenrod, and Chinese tallowtree—an invasive tree species. The plant communities at the site were not affected by the hurricanes of 2005.

The site has a small intermittent stream channel that drains its center and is bordered by forested and emergent palustrine wetlands. The wetlands and intermittent stream are the headwaters of Pine Branch, which flows south out of the site and through a culvert under Highway 42. A manmade pond occupies approximately 6.0 acres (2.4 hectares) at the western boundary of the proposed site and is surrounded by palustrine forested and emergent wetlands. The species in forested wetlands areas include red maple, sweet gum, tupelo, and Chinese tallowtree. A variety of sedges, rushes, bulrush, and pitcher plants comprise the dominant species in the emergent wetlands adjacent to the stream channel and manmade pond.

The terrestrial wildlife observed in the vicinity of the Richton site during the site visit include white-tailed deer, armadillo, raccoon, opossum, black vulture, and red-tailed hawk, which are common, fairly mobile species adapted to living in disturbed habitat areas.

The manmade pond located near the central western boundary of the Richton site probably supports a small fish population, including minnows, sunfish, bass, and catfish. Because of the lack of permanent water in Pine Branch Creek, it probably does not support a permanent fish population. The permanent surface water bodies outside the boundaries of the proposed Richton site are fresh water systems and have species that are typical of these communities in the southern United States.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Richton storage site would be located: red-cockaded woodpecker, gulf sturgeon, pearl darter, Camp Shelby burrowing crayfish, gray myotis, Louisiana quillwort, black pine snake, Eastern indigo snake, gopher tortoise, and the yellow-blotched map turtle. After a review of the conditions at the proposed Richton storage site and consultations with the USFWS and the Mississippi Natural Heritage Program, DOE determined that the federally listed black pine snake (candidate species) and gopher tortoise (federally threatened) may be affected. The Richton site does not have suitable habitat for any state-listed species and the Mississippi Natural Heritage Program confirmed no occurrences of state-listed species within 2 miles (3 kilometers) of the proposed site.

The black pine snake is a candidate species for federal listing under the ESA and has been documented within 2 miles (3 kilometers) of the Richton site in Perry County (Clark 2005; MNHP 2006). Its preferred habitat is sandy, well-drained soils with an **overstory** of longleaf pine, a fire-suppressed midstory, and a dense herbaceous ground cover (Duran 1998b). It is rarely found in riparian areas, hardwood forests, or closed **canopy** conditions (Duran 1998a).

The federally threatened gopher tortoise prefers locations with dry sandy soils, abundant ground cover, and a sparse canopy. Although seldom seen above ground, the presence of large conspicuous burrows is indicative of its presence.

Special Status Areas

No special status areas exist within or near the boundaries of the proposed Richton site.

3.7.7.1.2 Richton Rights-of-Ways

The proposed Richton storage site would require a 10-mile (17-kilometer) RWI pipeline, two 88-mile (142-kilometer) dual-purpose crude oil and brine pipelines to Pascagoula, a 116-mile (186-kilometer) crude oil pipeline to Liberty, and two 138-kilovolt power lines in the following ROWs:

- The proposed RWI pipeline would share the ROW with the rest of the pipelines for 5.8 miles (9.3 kilometers) and then continue south for 4.6 miles (7.3 kilometers) to the RWI structure on the Leaf River.
- The proposed crude oil pipeline to Liberty terminal would share an ROW for 5.8 miles (9.3 kilometers) with the power lines, RWI, brine disposal, and crude oil pipeline to Pascagoula. It then heads west 110 miles (177 kilometers) to the terminal at Liberty.
- The proposed crude oil pipeline to Pascagoula and brine disposal pipeline would share the 5.8 mile (9.3 kilometers) ROW with other pipelines. They join an existing pipeline ROW for 72 miles (116 kilometers) to Pascagoula City. The pipelines continue for 9.5 miles (15 kilometers) to the terminal on Singing River Island. The proposed brine disposal pipeline would then continue into the Gulf of Mexico to the brine diffuser located about 13 miles (20 kilometers) offshore.
- The proposed power lines follow the RWI pipeline and connect to existing power lines 1 mile (0.6 kilometers) south of the RWI structure.

Plants, Wetlands, and Wildlife

Approximately 30 percent of the ROWs for the proposed pipelines follow existing ROW corridors. These easements have been disturbed by previous construction and periodic maintenance activities. The crude oil pipeline, RWI pipeline, brine disposal pipeline, and power lines share an exit ROW for 5.8 miles (9.3 kilometers) south from the Richton storage site. This proposed ROW would cross 62 percent pine and hardwood forested habitat and approximately 27 percent grassland habitat. Seven percent of the proposed ROW would cross palustrine wetlands. The grassland category includes natural areas of low herbaceous cover, but also includes range or pasture areas. The classification of pine forests in the Gap Analysis Program data does not distinguish between natural evergreen forests and pine plantations. In Mississippi, roughly one-third of evergreen forests are pine plantations that are subject to frequent thinning and application of fertilizers and herbicides.

The main wetland type within the ROWs are palustrine forested wetlands or bottomland hardwood forests. This habitat type used to be common throughout the Southeast. Agriculture, flood control, and land development have drained, converted, or fragmented large areas of these forests; thus, Mississippi recognizes this habitat type as vulnerable (MMNS 2002).

The RWI ROW continues south from the end of the shared exit ROW to the RWI structure at the Leaf River. The majority of this ROW is forested with 57 percent pine forest and 15 percent hardwood. The remaining area consists of palustrine forested wetlands associated with the floodplain of the Leaf River. The power line ROW would cross similar habitat types and wetlands as the ROW for the RWI.

The proposed crude oil pipeline to Liberty continues from the end of the exit ROW west for 110 miles (177 kilometers) to Liberty Station. Ninety-seven percent of this proposed ROW contains upland habitats of pine forest, hardwood forest, grasslands, and disturbed areas. Palustrine forested wetlands are the dominant wetland category found in the proposed corridor. A proposed pump station for the crude oil pipeline would require approximately 1.7 acres (0.7 hectares) of land. The proposed site for the pump station includes mostly grassy or open areas with approximately 13 percent of the area comprised of mixed pine and hardwood forests.

The proposed crude oil pipeline ROW to Pascagoula would follow an existing 72-mile (116-kilometer) pipeline ROW to the City of Pascagoula. Nine miles (15 kilometers) of the proposed pipeline would cross through the City of Pascagoula in a new ROW to the terminal on Singing River Island. The

dominant vegetation present along the corridor is pine forest. Approximately 13 percent of the proposed ROW contains wetlands, mostly palustrine forested wetlands in the interior sections of the ROW. As the ROW approaches the coast, it crosses estuarine wetlands.

Based on the various land classification types and the wetlands present along the ROWs, several common mammals, birds, amphibians, and reptiles may use the existing habitats within the ROWs. These species would be similar to those described under the Richton storage site description. The ROWs would cross fresh-water systems that include common species of fish such as fresh-water eels, minnows, mullet, catfish, suckers, sunfish, bass, perch, and darters—all of which are common throughout the Gulf Coast region, and adapt well to changes in the environment.

Special Status Species

A literature review indicated that the following federally listed species may be present within the counties where the proposed Richton ROWs would cross: bald eagle, brown pelican, Mississippi sandhill crane, piping plover, red-cockaded woodpecker, Gulf sturgeon, pearl darter, Camp Shelby burrowing crayfish, gray myotis, Louisiana black bear, Louisiana quillwort, Alabama red-belly turtle, black pine snake, Eastern indigo snake, gopher tortoise, Kemp's ridley sea turtle, loggerhead sea turtle, yellow-blotched map turtle, and several marine mammals. A review of the conditions at the Richton pipeline ROWs and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that areas included in the pipeline ROWs may provide suitable habitat for several of these federally listed threatened or endangered species.

The pearl darter (a federal candidate species) has been documented throughout the Leaf River to the lower Pascagoula drainage, but little is known about their specific habitat requirements or spawning behavior (Slack et al. 2005). Proposed ROWs that would cross this drainage system include the pipeline ROW from Richton to Pascagoula and the pipeline ROW from Richton to Liberty Station. The pipeline ROW from Richton to Liberty Station would cross the Leaf River in Forrest County. The proposed pipeline ROW from Richton to Liberty station would also cross Black Creek in Lamar County and Tallahala Creek in Perry County. Candidate species are not regulated under the ESA unless they are listed as threatened or endangered by the USFWS or NOAA Fisheries before the proposed action is undertaken.

The black pine snake and gopher tortoise are both found on well-drained sandy soils with sparse forest canopy. Data from Mississippi Natural Heritage Program confirms populations of gopher tortoises within 2 miles (3 kilometers) of all proposed ROWs and the black pine snake within 5 miles (8 kilometers).

Species that are listed as threatened or endangered by Mississippi but are not federally listed are summarized in appendix I for the counties containing parts of the Richton development. Table 3.7.7-1 lists the species that the Mississippi Natural Heritage Program has confirmed within 2 miles (3 kilometers) of the proposed ROWs.

There are no known occurrences of these species within the proposed ROWS; however, no comprehensive survey or habitat assessments have been conducted.

Special Status Areas

The proposed crude oil pipeline to the Pascagoula terminal would be located about 1 mile (1.6 kilometers) from the Grand Bay National Estuarine Research Reserve. Approximately 0.5 mile (0.7 kilometer) of the proposed ROW to Liberty would pass through Percy Quin State Park.

Table 3.7.7-1: State-listed Species Within 2 miles of Richton ROWs

Common Name	State Status	Global Status ^a	Potentially Suitable Habitat at Site
Dark gopher frog	Endangered	Critically imperiled	Pine and upland hardwood forest mixed with wetlands forests
Crystal darter	Endangered	Vulnerable	Pearl River
Frecklebelly madtom	Endangered	Vulnerable	Pearl River
Rainbow snake	Endangered	Secure	Streams, marshes (emergent wetlands), and sandy fields

Notes:

^a Secure is defined by NatureServe and the Mississippi Natural Heritage Program as common, widespread, and abundant. Apparently secure is defined as uncommon, but not rare. Vulnerable is defined as at moderate risk of extinction due to range restrictions and relatively few populations (80 or fewer). Critically imperiled is defined as a species at a very high risk of extinction due to very few populations or other factors.

3.7.7.1.3 Raw Water Intake and Access Road

Plants, Wetlands, and Wildlife

The proposed RWI structure would be located along the shoreline of the Leaf River. The area is characterized by mixed hardwood forest that is periodically flooded. When DOE visited the location in October 2005, the area was significantly affected by Hurricane Katrina. Only about 20 percent of the surrounding forest remained intact. In the next few years, this area will experience a successional transition that will probably increase species diversity and the density of understory vegetation. The terrestrial wildlife present at the proposed RWI structure includes mammals, birds, and reptiles that are common throughout the southeast. The likely change in the vegetation post-hurricane would attract more birds and wildlife as the increase of shrubby vegetation and other early successional species provides more food resources.

The proposed access road to the RWI structure would be 2.3 miles (3.7 kilometers) long. From the existing road, the access road would cross pine forest and then mixed hardwood forest, which includes the palustrine forested wetlands adjacent to the Leaf River.

The Leaf River is part of the Pascagoula drainage system and supports a wide variety of aquatic species. It has a sand and gravel bottom and does not support submerged aquatic vegetation. At the proposed location of the intake structure, the river has a steep bank on one side and a wide sandy beach on the other. A diverse fish assemblage is present in the Leaf River, including 17 families (e.g., Centrarchidae, Clupeidae, Cyprinidae, Ictaluridae, Percidae) and over 75 species of fish (Ross 2001; MMNS 2006). In addition, the American eel and gulf sturgeon are seasonally present in the Leaf River and may live in the river during early stages of their life cycle.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Richton RWI would be located: red-cockaded woodpecker, gulf sturgeon, pearl darter, Camp Shelby burrowing crayfish, gray myotis, Louisiana quillwort, black pine snake, Eastern indigo snake, gopher tortoise, and the yellow-blotched map turtle. A review of the conditions at the Richton RWI and consultations with the USFWS and the Mississippi Natural Heritage Program revealed that the area may affect several federally listed threatened or endangered species.

The black pine snake, which is a federal candidate species, reportedly occurs in the vicinity of the proposed RWI intake in Perry County. Some areas near the RWI contain potentially suitable habitat of sandy, well-drained soils with an overstory of longleaf pine, a fire-suppressed midstory, and a dense herbaceous ground cover (Duran 1998b).

The gopher tortoise has been recorded in the vicinity of the proposed location of the RWI structure (MNHP 2006). Habitat suitable for the gopher tortoise may be found at this location (i.e., locations with dry sandy soils, abundant ground cover, and a sparse canopy). Although seldom seen aboveground, the presence of gopher tortoises is indicated by large conspicuous burrows. No burrows were observed at the proposed RWI site; however, a comprehensive survey of the site has not been completed.

The range of the yellow-blotched map turtle includes the Leaf River in the general area where the proposed RWI structure would be sited. The yellow-blotched map turtle is a federally threatened species. This species prefers habitats with sand, clay, or rocky bottoms with limestone ledges along banks (McCoy and Vogt 1987). It also uses oxbow lakes, semipermanent ponds, or temporary flooded pools (Jones 1996). Nesting occurs on sandbars or in small clearings along the bank of a river such as on a clay bank with a steep slope (Horne et al. 2003).

The gulf sturgeon is found in the proposed location of the RWI for the Richton site on the Leaf River in Perry County. This segment of the Leaf River is designated as critical habitat for this federally threatened species. Although the entire potentially affected segment of this river is designated critical habitat, spawning generally occurs only in areas where the streambed is hard clay, rubble, gravel, or shell (68 CFR Part 13370). Adult sturgeons are anadromous fish that inhabit the fresh-water river for spawning. However, juvenile sturgeons may be found year-round because young sturgeons spend their first 2 years in the river in which they were spawned (68 CFR Part 13370).

The pearl darter, which is a federal candidate species, is believed to exist only in the Pascagoula River drainage system that includes the Leaf River (NatureServe 2005). The only area where pearl darter spawning has been documented in recent decades is in the Leaf River near Hattiesburg, MS, which is located upstream from the proposed RWI.

After a review of the conditions at the proposed RWI and consultations with the Mississippi Natural Heritage Program, DOE determined that the proposed RWI would not affect any state-listed special status species (see appendix I).

Special Status Areas

No special status areas exist at or near the proposed location of the RWI structure.

3.7.7.1.4 Terminal in Pascagoula

Plants, Wetlands, and Wildlife

The proposed marine terminal in Pascagoula would be a 63-acre (25-hectare) facility located on Singing River Island. Singing River Island is a 440-acre (180-hectare) manmade island composed of deposited dredged materials. The proposed terminal would be located adjacent to and partially overlap the site of the current Pascagoula Naval Station, which was selected for closure by the Commission on Base Realignment and Closure in 2005. The proposed site for the SPR terminal would occupy about 63 acres (26 hectares). A little more than half of the proposed site (35.6 acres [14.4 hectares]) is identified as estuarine wetlands by the National Wetlands Inventory map. About 75 percent of the proposed terminal

is located within the low-lying diked area within the central part of the island. The remaining area is comprised of developed land and maintained grassy areas associated with the Naval Station. The grassy areas on the site and the undeveloped portions of the island offsite support shore birds, rabbits, alligator, snakes, and nutria. The Naval Station has problems with overpopulation and overgrazing by rabbits and nutria and released two spayed bobcats in 1995 to help control the rodent population.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Pascagoula terminal would be located: bald eagle, brown pelican, Mississippi sandhill crane, piping plover, red-cockaded woodpecker, gulf sturgeon, pearl darter, Louisiana black bear, several marine mammals, Louisiana quillwort, Eastern indigo snake, gopher tortoise, Kemp's ridley sea turtle, loggerhead sea turtle, and the yellow-blotched map turtle. However, after a review of the conditions at the proposed Pascagoula terminal and consultations with USFWS and the Mississippi Natural Heritage Program, DOE determined that the proposed terminal would not affect any federally or state-listed listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

The proposed terminal site is located more than 6 miles (9.7 kilometers) from the Grand Bay National Estuarine Research Reserve (NOAA 2005a, 2005b).

3.7.7.1.5 Terminal at Liberty Station

Plants, Wetlands, and Wildlife

The 66 acre (27 hectare) proposed terminal at Liberty Station would be located adjacent to another oil tank farm in an otherwise rural area east of Liberty, Mississippi. The entire site is disturbed upland habitat comprised mostly of pasture with fragmented pine and hardwood forests. According to the National Wetlands Inventory data, no wetlands exist on the site.

Wildlife that inhabits this area includes common, mobile species such as the nine-banded armadillo and white-tailed deer, which are adapted to living in somewhat disturbed habitat areas.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Liberty terminal would be located: red-cockaded woodpecker and the Louisiana black bear. However, after a review of the conditions at the proposed Liberty terminal and consultations with USFWS and the Mississippi Natural Heritage Program, DOE determined that the proposed terminal would not affect any federally or state-listed listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

There are no special status areas located within or near the proposed terminal at Liberty Station.

3.7.7.2 Impacts

3.7.7.2.1 Richton Storage Site

Plants, Wetlands, and Wildlife

The development of the proposed Richton storage site would affect about 346 acres (140 hectares), which includes a 109-acre (44-hectare), 300-foot (91-meter) buffer cleared for security purposes. The proposed construction would affect the following:

- 3 acres (1 hectare) of palustrine emergent wetlands,
- 6 acres (2 hectares) of palustrine forested wetlands,
- 312 acres (133 hectares) of pine plantation, and
- 25 acres (10 hectares) of clear cut and field.

The proposed access road would be 990-feet (300 meters) long and extend from Highway 42 to the site. The area of the proposed road would affect about 0.5 acres (0.2 hectares) of pine forest. The pine forest and logged areas are actively managed and disturbed by timber harvesting. These areas are low quality habitat for plants and animals. The palustrine forested wetlands within the security buffer would be permanently converted to emergent wetlands as DOE would not allow trees to regrow in this area. The proposed construction footprint would avoid the manmade pond, which would reduce the hydrological modification of the site and preserve some fringe wetlands and their associated functions.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and would preserve onsite to the maximum extent practicable. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid and minimize and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 in accordance with the 404 permit and 401 Water Quality Certificate from the USACE and the Mississippi Department of Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

Because the habitats present at the Richton storage site are actively disturbed by logging and do not represent regionally unique habitats, there would be little affect to terrestrial wildlife. Some wildlife would be killed and some would be displaced by the construction activities. Fencing would exclude most wildlife from the site, though some mobile species and birds would probably still visit the site. As discussed in section 3.7.2, the wildlife species would be displaced to similar vegetative and wetlands communities surrounding the proposed site. Though these impacts may affect individual organisms, construction, operations, and maintenance of the facility would not alter the regional population or species viability.

Aquatic species in the manmade pond would not be affected by construction because DOE would not alter the pond. The intermittent streams located within the site would be affected as the natural flow would be altered and the runoff associated with the clearing and grading would temporarily degrade their water quality. As described in section 2.3, an erosion- and sediment-control plan and the Mississippi Pollutant Discharge Elimination System stormwater permit for construction activities would be secured, which would require the use of construction best management practices to minimize the impact to water bodies.

Potential operational and maintenance impacts on migratory birds, such as the affect of artificial lighting on migration, are described in section 3.7.2.

Mitigation: DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. DOE would use down-shielded and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. If this candidate alternative is selected, DOE would conduct a survey of raptor nests and secure any necessary permits in accordance with the requirements of the Migratory Bird Treaty Act.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize impacts to wetlands and forests.

Special Status Species

Because the black pine snake has been confirmed within 2 miles (3 kilometers) of the site, DOE would survey the site for evidence of black pine snakes or suitable habitat. DOE would consult with the USFWS if suitable habitat or individuals were found on the site.

DOE would have a biologist to survey moderately well-drained to excessively well-drained sandy soils for gopher tortoise burrows. If gopher tortoises or their burrows are found, DOE would contact the Mississippi Department of Wildlife, Fisheries, and Parks and the USFWS. DOE would initiate formal Section 7 Consultation if development of the storage site may adversely affect the gopher tortoise. If required, DOE would prepare a Biological Assessment and implement the conditions of a Biological Opinion. Gopher tortoises and/or black pine snakes would be relocated only with concurrence of the USFWS and the Mississippi Department of Wildlife, Fisheries, and Parks; according to strict protocols; and within seasonal windows specified by these agencies (MNHP 2006).

3.7.7.2.2 Richton Pipeline Rights-of-Way

Plants, Wetlands, and Wildlife

Construction in the pipeline and power line ROWs would result in clearing all the vegetative within the ROW. The ROW clearing would affect the following areas:

- 822 acres (333 hectares) of grasslands,
- 521 acres (211 hectares) of disturbed, managed, or urban land,
- 481 acres (195 hectares) of hardwood forest,
- 1024 acres (414 hectares) of pine forest, and
- 271 acres (110 hectares) of water and emergent wetlands.

As described under the affected environment, the majority of the pine forests that would be affected are pine plantations. Because DOE aggregated the Mississippi GAP Analysis Program to identify upland habitat, some of the acreage listed above under hardwood forest or grasslands may include wetlands. DOE used USFWS National Wetlands Inventory data to determine that the following wetlands would be affected by the proposed ROW:

- 786 acres (318 hectares) of palustrine forest,
- 183 acres (74 hectares) of palustrine scrub-shrub,
- 156 acres (63 hectares) of estuarine,
- 40 acres (16 hectares) of palustrine emergent,

- 19 acres (8 hectares) of lacustrine,
- 15 acres (6 hectares) of palustrine open water,
- 32 acres (13 hectares) of palustrine unconsolidated bottom,
- 12 acres (5 hectares) of riverine,
- 3 acres (1 hectare) of estuarine scrub-shrub, and
- 2 acres (1 hectare) of palustrine (aquatic bed).

Permanent impacts from the maintained ROW would be about 33 to 40 percent of the acreage reported above. The vegetation within the construction easement would be cleared, but DOE would regrade to preconstruction contours and reseed with native species within this area to re-establish native habitat. The area within the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be regraded to preconstruction conditions and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands, and the nature and amount of wetland impact from the permanent and construction easements. Within the permanent ROW easement, the open water, emergent and riverine wetlands would be allowed to return to preconstruction conditions. Section 3.7.2 describes ROW operations and maintenance effects in more detail.

DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would use or directional drilling to avoid sensitive wetland areas or large water bodies greater than 100 feet (30 meters). DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid and minimize and compensate for wetland impacts to jurisdictional wetlands. To limit impacts to aquatic habitats, DOE would implement appropriate best management practices to minimize erosion and runoff as described in chapter 2. Moreover, about 20 percent of the pipeline ROWs would be located along an existing ROW. Use of existing ROW corridors to the maximum extent practicable would minimize the impact to undisturbed communities and wildlife. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in accordance with the Section 404/401 permit conditions, which would compensate for the jurisdictional wetland impacts.

As stated in section 3.7.2, construction in the ROWs would displace or kill some aquatic and terrestrial wildlife. The impacts would not alter the state population or the species viability. Noise and human activity may temporarily preclude some organisms from using nearby habitat. The duration of construction through these areas would be short (6 to 10 weeks at any one location) and ample habitat would be available nearby for most species. The elevated portion of the power lines could represent a strike hazard that could impact resident and migratory birds. However, the maximum tower height is expected to be 75 feet (23 meters), which would greatly reduce the hazard. Though these impacts may affect individual organisms, construction, operations, and maintenance of the pipeline and power line ROWs would not alter the regional populations of wildlife or species viability.

The impacts associated with the operations and maintenance of the ROWs are described in section 3.7.2.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat such as wetlands and habitat for special status species. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems identified. For the proposed power lines, DOE

would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Power lines: the State of the Art in 1996* (APLIC 1996).

Special Status Species

Construction of the proposed pipeline to Liberty Station would not affect the pearl darter because directional drilling would be used to place the pipeline beneath the Leaf River, Black Creek, and Tallahala Creek without instream activity. If directional drilling was not feasible, DOE would use conventional open-ditch excavation. Conventional construction methods may affect the pearl darter; thus, DOE would consult with the USFWS to develop a construction plan that would not adversely affect the species.

The proposed ROWs may affect the black pine snake if it inhabits the site. These snakes live in burrows underground. DOE would conduct habitat assessments of the proposed ROWs to determine if surveys for black pine snakes are necessary. If suitable habitat exists or black pine snakes inhabit the ROW, DOE would consult with the USFWS and Mississippi Natural Heritage Program to identify methods to avoid adverse effects. The black pine snake is a mobile species and would generally be expected to avoid construction activities. Individuals identified during construction would be relocated to nearby suitable habitat under guidance of USFWS. Operations and maintenance of pipeline ROWs would not affect the black pine snake. Mowing of the ROW would maintain the ROW as habitat preferred by the black pine snake.

DOE would conduct surveys for gopher tortoise burrows on moderately well-drained to excessively well-drained sandy soils of the ROWs. If burrows or gopher tortoises are identified within the ROW, DOE would initiate formal Section 7 Consultation with the USFWS. DOE would prepare a Biological Assessment if the proposed activity had the potential to adversely affect the gopher tortoise. All burrows identified during preconstruction field assessments would be marked and cogon grass—an invasive species that destroys tortoise habitat (Van Loan et al. 2002)—would be mapped and treated with chemicals approved for use around tortoises. Where possible, clearing and construction activities would be precluded within a 25-foot (8-meter) radius around each burrow. The crude oil pipeline to Liberty terminal, RWI pipeline, and power lines do not, for the most part, follow an existing ROW. Alignments may be adjusted to avoid relatively large clusters of burrows. When burrows cannot be avoided, tortoises would be relocated only with concurrence of the USFWS and the Mississippi Department of Wildlife, Fisheries, and Parks; according to strict protocols; and within seasonal windows specified by these agencies.

Because moderately to excessively well-drained sandy soils of the maintained pipeline and power line ROWs would provide potential habitat for the gopher tortoise, these areas may attract more tortoises than their preconstruction condition. DOE would monitor these areas for the presence of gopher tortoise mounds and control the invasion and spread of cogon grass using only herbicides approved for use around tortoises to avoid poisoning food resources (MNHP 2006). With proper monitoring and procedures, operations and maintenance activities may improve habitat quality for gopher tortoises.

The state-listed species confirmed to exist within 2 miles (3.2 kilometers) of the proposed Richton ROWs are the dark gopher frog, crystal darter, frecklebelly madtom, and rainbow snake. Based on the data available, DOE does not expect the proposed ROWs to affect these species. The crystal darter and frecklebelly madtom are known to inhabit the Pearl River. The crude oil pipeline to Liberty would be directionally drilled under the Pearl River so there would be no changes in the instream environment. The occurrence of the rainbow snake is recorded along Preists Creek, which would not be crossed by any ROW. The dark gopher frog population is located more than 1 mile (1.6 kilometers) from the proposed

ROW. At this distance, DOE would not expect construction, operation, or maintenance to affect the species.

Special Status Areas

The proposed Pascagoula crude oil pipeline would not affect the Grand Bay National Estuarine Research Reserve because it is located about 1 mile (1.6 kilometers) away. The proposed ROW to Liberty terminal would pass through Percy Quin State Park. The proposed alignment does not follow an existing ROW through the park. If the Richton site were selected, DOE would consult with the Park to identify a corridor that avoids sensitive resources in the park. DOE may be able to realign the pipeline ROW to follow one of the existing ROW corridors to minimize affects to natural resources.

3.7.7.2.3 Raw Water Intake

Plants, Wetlands, and Wildlife

About 5 acres (2 hectares) of palustrine forested wetlands would be cleared to construct the RWI structure. About one half of this area would be restored after construction is complete. The access road to the structure would permanently remove 3 acres (1 hectare) of palustrine forested wetlands and 7 acres (3 hectares) of pine forest. As discussed in section 3.7.2, construction activities would cause displacement of terrestrial and aquatic species to adjacent undisturbed areas of similar habitat.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from the USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands to the maximum extent practicable. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for wetland impacts to jurisdictional wetlands. DOE would submit an application for a stream diversion permit from the Mississippi Department of Environmental Quality for the proposed water withdrawal. DOE would implement the mitigation measures described in section 3.7.2 in accordance with the 404 permit, 401 Water Quality Certificate from the USACE, and a stream diversion permit from the Mississippi Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts. As discussed in chapter 2, erosion would be minimized with the use of best management practices. An erosion- and sediment-control plan and NPDES stormwater permit issued by the Mississippi Department of Environmental Quality for construction activities would be secured, which would require the use of best management practices that minimize the impact to water bodies.

The operation of the RWI structure would affect some terrestrial species that would avoid the area due to human activity and noise from the pumps. The aquatic communities in the Leaf River at the site and downstream would potentially be impacted by the withdrawal of water, especially during low flow conditions. During cavern development, up to 1.2 MMBD (50 million gallons per day) would be withdrawn from the Leaf River for a period of 4 to 5 years and periodically afterwards for drawdown or cavern maintenance after construction is completed. During times of low-flow, the withdrawal could equal 11 percent or more of the total flow in the river. Such a withdrawal rate during low-flow conditions could significantly impact the downstream aquatic communities as the decrease in flow would lower the water depth, reduce the width of the stream channel, and change the currents. Such impacts would stress aquatic organisms by exposing once submerged nesting and feeding areas, altering vegetative communities, potentially changing the temperature regime, and impairing water quality.

Without mitigation, withdrawal during low-flow rates could affect riverine wetlands and aquatic organisms. It would also affect species that rely on aquatic prey species for food. The severity of these impacts would depend on the length and frequency of low-flow rates in the Leaf River during the 4 to 5 years of cavern solution mining. Operation of the RWI structure in these conditions would result in a significant impact on aquatic species, and a moderate impact on other species that depend on Leaf River water resources.

During water withdrawal activities and operation of the RWI, some small aquatic organisms would become entrained or entrapped on the intake—especially larval stages, juveniles, and dispersed fish eggs as described in section 3.7.2. The entrainment and impingement would be minimized by equipping the RWI with appropriate mesh size, intake velocities, and traveling screens to collect and return aquatic life to the Leaf River.

Special Status Species

Construction of the RWI structure may affect the black pine snake and gopher tortoise. DOE would survey well-drained sandy soils for gopher tortoise burrows and evidence of the black pine snake or suitable habitat. If the gopher tortoise or burrows were identified, DOE would initiate formal Section 7 Consultation with the USFWS and coordinate with the Texas Parks and Wildlife Department. If the project may adversely affect the gopher tortoise, DOE would prepare a Biological Assessment and implement any condition included in the Biological Opinion. Before construction, individuals living on the proposed site would be relocated, under strict guidance of USFWS. DOE would also consider moving the location of the RWI on the Leaf River to avoid the black pine snake and gopher tortoise if they were found to be present. Operations and maintenance activities at the RWI structure involve infrequent human disturbance and would not affect black pine snakes or gopher tortoises near the site.

Construction of the RWI on the Leaf River may affect the yellow-blotched map turtle. Any turtles in the work zone would be moved to an adjacent undisturbed area upstream each day prior to the start of work. Best management practices, such as the use of a cofferdam, would be employed to minimize water quality and sedimentation impacts. Upon completion of the RWI structure, the streambed would be restored to the extent possible to minimize long-term impacts of construction. Although there may be short-term effects, in the long-term, construction would not likely adversely affect the species viability or designated critical habitat.

Operation of the RWI during cavern development would withdraw up to 1.2 MMBD (50 million gallons per day) for 4 to 5 years during solution mining. This would alter flow in the Leaf River especially during low-flow periods in the late summer and early fall. Reduced flow would degrade water quality by reducing the capacity of the river to assimilate wastes from nonpoint pollution sources and permitted discharges. Impaired water quality has contributed to the decline of the yellow-blotched map turtle through adverse effects on its food resources. In addition, withdrawal of water may affect the species by entraining or impinging small turtles or their invertebrate prey. Impinged turtles would be returned to the water downstream of the intake by traveling screens. During normal to above average flows, the entrainment or impingement of yellow-blotched map turtle prey food resources would not affect the turtles. During extreme low-flow periods, entrainment or impingement of prey may stress the species, but such periods are expected to be temporary and not affect the long-term survival of the species.

The RWI structure would be located on the Leaf River in Perry County and the power lines for the RWI structure and site would cross the Leaf River. Construction of the RWI may affect the designated critical habitat for the Gulf sturgeon at this location and the area immediately downstream. For example, excavation would disturb the Leaf River streambed, remove vegetation, and temporarily raise turbidity while reducing dissolved oxygen levels. These potential effects would be mitigated with the use of

erosion barriers, cofferdams, postconstruction restoration, and other measures. Construction would be scheduled to avoid spawning periods (mid-February to April) and limited to high-water periods. Construction of the power lines across the Leaf River is not expected to have any additional effect on the Gulf sturgeon because no instream work would occur.

Operations and maintenance of the RWI may have an adverse affect on the Gulf sturgeon, especially during low-flow periods. DOE has conducted informal consultation with the USFWS and Mississippi Natural Heritage Program on the proposed withdrawal. Both agencies expressed serious concerns about water flow and the Gulf sturgeon. The Mississippi Natural Heritage Program (2006) stated that “because of the importance of the Leaf River near Hattiesburg to spawning and juvenile sturgeon, it is recommended that water withdrawals be discontinued if discharge from the Leaf River reaches 30 percent of the mean daily discharge.” DOE reviewed the daily average streamflow data for the Leaf River for a 21-year period from 1983 through 2004 and determined that the mean daily discharge was 3,770 cubic feet (107 cubic meters) per second and 30 percent of that flow was 1,131 cubic feet (32 cubic meters) per second. During the same 21-year period, the daily discharge was less than the 30 percent minimum instream flow recommended by the Mississippi Natural Heritage about 27 percent of the time.

Decreased flow would potentially alter the designated critical habitat by reducing water depth and width, increasing pollutant concentrations, and altering water temperatures. These changes may expose breeding areas, limit adult migration movements, and/or increase mortality of larval and juvenile sturgeon. Intake of water during low-flow periods would affect water flow downstream and lower water depth in pools at the confluence of the Leaf and Chickasawhay Rivers where adult sturgeon rest with nonspawning individuals until fall when they return to saltwater (Heise et al. 2004).

The intake of the RWI would be designed for a maximum intake velocity of 0.5 feet (0.15 meters) per second. The raw water withdrawal may cause impingement of young Gulf sturgeon. Although moving vertical screens deposit impinged fish or materials into a chute that releases them downstream of the intake, impingement of young Gulf sturgeon would cause bodily harm that may result in mortality.

The pearl darter has been documented throughout the Leaf River to the lower Pascagoula drainage, but little is known about their specific habitat requirements or spawning behavior (Slack et al. 2005). Construction of the RWI may temporarily increase water turbidity. Increased turbidity has the potential to adversely affect pearl darters and other fish species downstream by making the habitat less suitable for feeding and reproduction (USFWS 2001). These temporary impacts would be mitigated with erosion and sedimentation best management practices, use of a cofferdam for instream work, as well as habitat restoration. DOE has determined that the construction of the RWI may affect the pearl darter.

Operation of the RWI may have an adverse affect on the pearl darter. The water withdrawal would be expected to have negligible impacts on the river while it is flowing near or above its overall average flow rate of 4,100 cubic feet (116 cubic meters) per second. During periods of low-flow, however, the withdrawal may constitute up to 11 percent of the river’s flow. The reduction in flow would alter water depth, channel width, water temperatures, and pollutant concentrations downstream. These types of alterations are identified as a major threat to pearl darter populations (USFWS 2001).

The water intake would also cause entrainment and impingement of pearl darters. The RWI would have a maximum intake velocity of 0.5 feet (0.15 meters) per second with traveling 0.5 inch (40 mm) mesh screen. Standard length of the adult pearl darter ranged from one inch (30 mm) to two inches (50 mm) in sampling of the Leaf River in 2004 (Slack et al. 2005). Due to their small size, impingement on the screens or entrainment through the screens would occur and would cause bodily harm that may lead to death of some individual fish.

If this site is selected, DOE would initiate formal Section 7 Consultation with the USFWS and NOAA Fisheries for a potential adverse affect to the Gulf sturgeon. DOE would prepare a Biological Assessment and implement any conditions of the Biological Opinion. DOE would consult with the USFWS and Mississippi Natural Heritage Program for potential adverse affects to the pearl darter.

After a review of the conditions at the proposed RWI and consultations with the Mississippi Natural Heritage Program, DOE determined that the proposed RWI would not affect any state-listed threatened, or endangered species (see appendix I).

3.7.7.2.4 Terminal in Pascagoula

Plants, Wetlands, and Wildlife

The proposed terminal in Pascagoula would involve redevelopment of a heavily disturbed portion of Singing River Island. The construction of the facility would remove approximately 34 acres (14 hectares) of estuarine wetland habitat and 1 acre (0.4 hectare) of estuarine scrub-shrub wetland habitat, as well as areas of maintained grass lawns and gardens. Because wildlife on the island is accustomed to frequent disturbance by human activity, operations and maintenance of the terminal would not add further disturbance to surrounding communities.

If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible. The placement of fill in the wetlands would cause a permanent loss of wetland functions and values. DOE would secure permits from USACE and the Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and would provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail.

DOE would implement best management practices and comply with permits for erosion and stormwater control during construction and operation of the facility to reduce impacts to aquatic resources. These are described in chapter 2.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Special Status Species

DOE determined that Pascagoula terminal would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

The proposed construction and operation of the Pascagoula terminal would not affect the Grand Bay National Estuarine Research Reserve because it is located more than 6 miles (9.7 kilometers) away from the proposed site.

3.7.7.2.5 Terminal at Liberty Station

Plants, Wetlands, and Wildlife

The clearing and grading associated with the Liberty Station terminal would affect approximately 66 acres (27 hectares) of the following vegetation types:

- 31 acres (13 hectares) of grasslands,
- 15 acres (6 hectares) of hardwood forest,
- 12 acres (5 hectares) of pine forest, and
- 7 acres (3 hectares) of disturbed or managed land.

According to National Wetlands Inventory data, one small area of approximately 2 acres (1 hectare) of palustrine open-water wetlands are located within the proposed terminal boundary. Small mammals living in the open areas could be displaced during construction, but would return to the area after construction is complete. The forested areas are fragmented and not likely to support large mammals other than deer. Once security fencing is constructed, larger mammals would be precluded from entering facility boundaries. Birds that utilized the forested areas for nesting or foraging would be permanently displaced to similar forested patches that are common in the area. Some mobile wildlife species and birds would use the site after construction is complete even though a security fence would surround the site.

If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible. The entire footprint would be cleared of trees for security reasons. The placement of fill in the wetlands would cause a permanent loss of wetland functions and values. DOE would secure permits from USACE and the Mississippi Department of Environmental Quality for the impact to jurisdictional wetlands and would provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail. DOE would implement best management practices and comply with permits for erosion and stormwater control during construction and operation of the facility to reduce impacts to aquatic species and resources.

The common operations and maintenance efforts, described in section 3.7.2, would preclude wildlife sensitive to human disturbance from entering the area. These efforts to operate and maintain the terminal would be similar to activities occurring at other industrial facilities located near the proposed site.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Special Status Species

DOE determined that the Liberty Station terminal would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices G and I).

Special Status Areas

There would be no impacts to special status areas by constructing or operating the terminal at Liberty Station.

3.7.8 Stratton Ridge Storage Site and Associated Infrastructure

This section addresses the proposed Stratton Ridge site and infrastructure areas, including the following:

- Storage site and site access road;
- Four proposed ROW segments: RWI pipeline, brine disposal pipeline, and power line ROW from Stratton Ridge to the RWI on the ICW; the brine disposal pipeline ROW from the RWI to the Gulf of Mexico; the crude oil pipeline ROW from Stratton Ridge to Texas City; and the crude oil pipeline connecting the terminal to local refineries;
- RWI; and

- Terminal and dock refurbishment in Texas City.

Because of the similarity among the proposed SPR facilities in offshore environment, offshore pipeline construction methods, and operations and maintenance of the brine diffuser, the discussion of the offshore pipeline and brine diffusion system for all proposed storage facilities is covered in section 3.7.2 and appendix E. Also due to these similarities among the proposed storage sites, the discussion of EFH is contained in section 3.7.2 and appendix E.

3.7.8.1 Affected Environment

3.7.8.1.1 Stratton Ridge Storage Site

Plants, Wetlands, and Wildlife

The proposed 370-acre (150-hectare) Stratton Ridge storage site, including a 102-acre (41-hectare), 300-foot (91 meter) buffer is in the Oak-Prairie Wildlife District within the Texas Gulf Coast Prairie Parkland Province (see appendix B) (TPWD 2005b; Bailey 1995). The Oak-Prairie Wildlife District includes some of the most ecologically diverse ecosystems in the state, historically characterized by savannas comprised of bluestem and browsed paspalum grasses intermixed with clusters of post-oak-dominated forests. As observed at the Stratton Ridge site, the Oak-Prairie Wildlife District vegetation also includes other tree species such as blackjack oak, live oak, water oak, winged elm, hackberry, and yaupon (TPWD 2005b). Although it remains forested, the Stratton Ridge site has been disturbed and fragmented by human activities and introduced animals and plants. Cattle and feral pigs roam throughout the site and their presence and activities, including grazing and burrowing, have long influenced the vegetative communities. Chinese tallowtrees are present throughout the site. Two large ROWs for large power lines and a multiple pipeline ROW flank the northeastern border of the site. Another pipeline ROW passes through the central portion of the site.

The site consists of palustrine forested wetlands with patches of deciduous forest and palustrine emergent wetlands. The site visit revealed that the proposed site includes about 260 acres (105 hectares) of palustrine forested wetlands that are not included in the National Wetlands Inventory data. DOE used the estimated wetland acreage from the site visit in the impact calculations because this approach provides a more accurate assessment than the NWI data. Live oak trees that characterize the forested wetlands are sometimes greater than 4 feet (1.2 meters) in diameter. Other canopy species include water oak and Chinese tallowtree, while greenbrier, trumpet creeper, pigweed, smart weed, and blackberry are present in the understory. Signs of periodic inundation, such as the prevalence of water-tolerant organisms and watermarks on trees, occur throughout the forest. Small pockets of upland islands are dispersed throughout the evergreen forest and occupy approximately 15 percent of land within the site. General species composition on the upland islands is similar to the composition on periodically inundated portions of the evergreen forest. Winged elm and Chinese tallowtree are the dominant species in the deciduous forest.

The forested wetlands on the Stratton Ridge site are categorized as a bottomland hardwood habitat, which is a diverse and greatly threatened ecosystem in the United States. These ecosystems provide habitat and play important roles in maintaining water quality and retaining flood waters. Bottomland hardwood forests are also important sources of organic material for aquatic ecosystems. Only 180,000 acres (72,000 hectares) of this type of ecosystem remain along the Texas Gulf Coast (TPL 2005). Despite its disturbed condition, the bottomland hardwood forest at the Stratton Ridge storage site is ecologically important because it represents one of the only contiguous patches of this habitat type within several miles. The land immediately surrounding Stratton Ridge is used for industrial facilities or pasture.

Four areas of permanent and semipermanent standing water with emergent vegetation are located on the proposed Stratton Ridge site. These emergent wetlands, which are located on the western edge of the proposed site boundary, span from 1 acre (0.4 hectares) to 7 acres (3 hectares) in size. They are characterized by sedges, rushes, legumes, and rattlebush. Chinese tallowtree is prevalent along the perimeter of the wetlands. No perennial streams are located within the site; however, ephemeral channels were observed in association with the site's wetlands.

Bottomland hardwood forests and emergent wetlands along the Texas Gulf Coast provide permanent or temporary habitat for hundreds of species of birds, including neotropical migratory songbirds. The proposed Stratton Ridge site is located in the center of the Central Flyway (Birdnature.com 2005). The Texas Gulf Coast is the primary wintering site for ducks and geese that use the Central Flyway. The area probably supports numerous bird species that are regulated by the Migratory Bird Treaty Act.

Oyster Creek and Stubblefield Lake are two fresh-water water bodies located less than 0.6 miles (1 kilometer) from the proposed Stratton Ridge storage site. These systems support common aquatic fish species such as bluegill, pugnose minnow, and gizzard shad. Neither Oyster Creek nor Stubblefield Lake have submerged aquatic vegetation. The vegetation is limited to the shoreline, emergent wetland, and other wetland areas.

The wildlife observed in the project area are common, mobile species such as the nine-banded armadillo and white tailed deer, which have adapted to living in somewhat disturbed habitat areas. Several bird species, such as spoonbills and great blue herons, were observed near the emergent wetlands. The water bodies associated with the wetlands onsite do not appear capable of supporting a fish community year-round because of periodic drying and low oxygen conditions. These systems likely support a variety of invertebrate organisms, reptiles, and amphibians.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Stratton Ridge storage site would be located: bald eagle, brown pelican, piping plover, whooping crane, and several marine mammals and sea turtles. A site visit to Stratton Ridge and consultations with USFWS and the Texas Parks and Wildlife Department revealed that the area may provide suitable habitat for the bald eagle, which is a federally listed threatened species, although USFWS has proposed delisting the bald eagle (see appendix H) (Aycok 2005; TPWD 2005a; Woodrow 2005). Brazoria County in eastern Texas has breeding and wintering bald eagles (TPWD 2005a; Woodrow 2005). No known bald eagle nests are located at the proposed Stratton Ridge site; however, the bottomland hardwood forest (palustrine forested wetlands) and emergent wetland habitat at the site is suitable for nesting or roosting bald eagles. A pair of bald eagles is known to nest near Ash Lake about 1.8 miles (2.7 kilometers) northwest of the proposed Stratton Ridge site. No other federally listed species is known to inhabit the site.

Appendix I identifies species listed as threatened or endangered by the State of Texas (but not listed federally) in counties in the proposed Stratton Ridge SPR development area. Table 3.7.8-1 shows a comparison of the habitat preferences of threatened or endangered species on the state list and habitat present in the proposed Stratton Ridge site.

None of these species is known to inhabit the site, but a survey or habitat assessment has not been conducted.

Table 3.7.8-1: State-Listed Species With Potentially Suitable Habitat at Stratton Ridge Storage Site

Species Common Name	State Status	Global Status^a	Potentially Suitable Habitat at Site
Swallow-tailed kite	Threatened	Secure (G5)	Tall, easily accessible trees; open areas for foraging
White-faced ibis	Threatened	Secure (G5)	Bayous and palustrine wetlands
Wood stork	Threatened	Apparently secure (G4)	Bayous and palustrine wetlands
Black bear	Threatened	Secure (G5)	Mixed deciduous-coniferous forest with thick understory
Smooth green snake	Threatened	Secure (G5)	Grasslands, forest, meadows, grassy marshes, moist grassy fields at forest edge, and abandoned farmland

Notes:

^a Secure is defined by NatureServe and the Texas Natural Diversity Database as common, widespread, and abundant. Apparently secure is defined as an uncommon species, but not rare. There is some cause for long-term concern.

Source : NatureServe 2005

Essential Fish Habitat

No EFH is located near or within the boundaries of the proposed storage facility.

Special Status Areas

There are no special status areas in or adjacent to the proposed Stratton Ridge storage site. The Brazoria National Wildlife Refuge is located 3.5 miles (5.6 kilometers) from the site; the Peach Point Wildlife Management Area is located 10 miles (16 kilometers) from the site; and the San Bernard National Wildlife Refuge is located 11 miles (17 kilometers) from the site. These protected areas provide coastal habitat to migratory birds, reptiles, and amphibians.

3.7.8.1.2 Stratton Ridge Rights-of-Way

Three pipeline and power line ROWs would be required for the Stratton Ridge storage site. The proposed ROWs would include the following:

- A proposed shared 6.2-mile (10-kilometer) ROW for an RWI pipeline, a brine disposal pipeline, and two (34.5-kilovolt) power lines. The shared ROW would leave the site and terminate at the RWI.
- A proposed 3.8-mile (6.1-kilometer) brine disposal pipeline would continue in an ROW from the RWI to the Gulf of Mexico, and then proceed to the offshore brine diffuser.
- A proposed 37-mile (60-kilometer) crude oil pipeline would parallel the existing Bryan Mound pipeline ROW to a terminal in Texas City, TX.
- A 2.7-mile (4.3-kilometer) crude oil pipeline that would connect the Texas City terminal to the British Petroleum and GAP Analysis Program facilities.

Plants, Wetlands, and Wildlife

Over 80 percent of the proposed 45 miles (72 kilometers) of ROWs for the pipelines and power line corridor follow existing utility easements. These easements have been disturbed by previous construction and periodic maintenance activities. Sand flats, which include estuarine emergent wetlands, is the dominant Texas GAP Analysis Program (plant community) classification crossed by the proposed shared 6.2-mile (10-kilometer) ROW to the RWI. Most of the estuarine wetlands crossed by the ROW are in the Brazoria National Wildlife Refuge. These wetlands are characterized by salt meadow cordgrass and mudflats.

The 0.8-mile (1.2-kilometer) brine pipeline ROW from the RWI to the Gulf of Mexico would cross estuarine emergent wetlands, sand flats, and beach habitat.

The 37-mile (60-kilometer) crude oil pipeline ROW would be located along an existing and maintained corridor, with approximately 75 percent of the ROW surrounded by hardwood forested habitat. The remaining habitat is a mixture of disturbed or managed areas, grassland, and beach or bare soil habitat. Wetlands are present in about 21 percent of the proposed ROW, with the majority being palustrine emergent wetlands.

The proposed 2.7-mile (4.3-kilometer) connecting pipeline from the Texas City terminal to the British Petroleum and GAP Analysis Program facilities would follow an existing road and drainage canal through disturbed habitat. Approximately 23 acres (9.2 hectares) have been identified by the National Wetlands Inventory data as palustrine unconsolidated bottom wetlands.

Based on the various land classification types and the wetlands present along the ROWs, several common mammals, birds, amphibians, and reptiles may use the habitats within the ROWs. Such species would be similar to those described under the Stratton Ridge storage site description. Organisms observed at the Brazoria National Wildlife Refuge include alligators, other reptiles, salamanders, other amphibians, coyotes, and bobcats (USFWS 2003). More than 200 species of birds have been observed at the refuge.

The typical species of fish found in southern fresh-water systems reside in streams and open water bodies crossed by the existing and new ROWs. Many of the fish species are common throughout the Gulf Coast region, adapt well to moderate environmental change, and include the following: fresh-water eels, suckers, minnows, sunfish and bass, mullet, perches and darters, and fresh-water catfish.

Special Status Species

A literature review indicated that the following federally listed species may be present within the counties where the proposed Stratton Ridge ROWs would be located: Attwater's greater prairie chicken, bald eagle, brown pelican, Eskimo curlew, piping plover, whooping crane, and several marine mammals and sea turtles. A review of the conditions along the ROWs and consultations with USFWS and the Texas Parks and Wildlife Department revealed that the proposed ROW from the Stratton Ridge site to the RWI may include suitable foraging habitat for the bald eagle, which is on the federal and state threatened species list (see appendix H). The bald eagle has been proposed for delisting from the federal ESA list by USFWS. No known bald eagle nests are located along the ROW, but emergent wetland habitat along the ROW may be suitable for foraging bald eagles that nest in the surrounding area. The closest known nest is located 2 miles (3.2 kilometers) from the crude oil pipeline to Texas City.

Appendix I identifies species listed as threatened or endangered by Texas, but not by the federal government, in the counties in the proposed Stratton Ridge area. Table 3.7.8-2 shows a comparison of the habitat preferences of threatened or endangered species on the state list and habitat present in the proposed Stratton Ridge ROWs.

Table 3.7.8-2: State-Listed Species With Potentially Suitable Habitat Along Stratton Ridge ROWs

Common Name	State Status	Global Status ^a	Potentially Suitable Habitat at Site
Arctic peregrine falcon	Threatened	Apparently secure (G4)	Estuarine wetlands and beaches
Eastern brown pelican	Endangered	Apparently secure (G4)	Estuarine wetlands and beaches
Reddish egret	Threatened	Apparently secure (G4)	Estuarine wetlands and beaches
Sooty tern	Threatened	Secure (G5)	Estuarine wetlands and beaches
Swallow-tailed kite	Threatened	Secure (G5)	Tall, easily accessible trees with open areas for foraging
White-faced ibis	Threatened	Secure (G5)	Bayous and palustrine wetlands
White-tailed hawk	Threatened	Apparently secure (G4)	Estuarine wetlands dominated by salt meadow cordgrass and beaches
Wood stork	Threatened	Apparently secure (G4)	Bayous and palustrine wetlands
Alligator snapping turtle	Threatened	Vulnerable (G3)	Water bodies, particularly slow moving, deep rivers and canals; shallow tributaries; and brackish waters near river mouths
Smooth green snake	Threatened	Secure (G5)	Grasslands, forest, meadows, grassy marshes, moist grassy fields at forest edge, and abandoned farmland

Notes:

^a Secure is defined by NatureServe and the Texas Natural Diversity Database as common, widespread, and abundant. Apparently secure is defined as an uncommon species, but not rare. There is some cause for long-term concern. Vulnerable is defined as at moderate risk of extinction due to range restrictions and relatively few populations (80 or fewer).

Source: NatureServe 2005

None of these species is known to inhabit the site, but a survey or habitat assessment has not been conducted.

Essential Fish Habitat

No EFH is located near or within the ROWs crossed by the proposed Stratton Ridge pipelines and power lines. As stated in the introduction to section 3.7.7, the offshore brine pipeline is discussed in section 3.7.2 and appendix E.

Special Status Areas

Approximately 3 miles (5 kilometers) of the co-located RWI pipeline, brine disposal pipeline, and power line ROW would cross the southwestern edge of the Brazoria National Wildlife Refuge, which is part of the Texas Mid-Coast National Wildlife Refuge Complex. In addition, 4.7 miles (7.6 kilometers) of the pipeline along the existing Bryan Mound pipeline ROW would cross the refuge along its northern border.

The brine disposal pipeline ROW from the ICW to the Gulf of Mexico would not be located in the national wildlife refuge.

Created in 1966, the Brazoria National Wildlife Refuge was established to provide habitat for migratory waterfowl and other birds. Currently, the refuge provides 44,000 acres (18,000 hectares) of coastal wetlands. The Texas Mid-Coast National Wildlife Refuge Complex is an important zone of coastal wetlands that serves as an endpoint of the Central Flyway for waterfowl in the winter. Neotropical migratory songbirds also use the refuges as stopovers during migration. These birds are in decline due in part because of loss of stopover habitat, as discussed in section 3.7.2. The wildlife refuge also provides habitat for alligators, turtles, small mammals, and other wildlife.

3.7.8.1.3 Raw Water Intake

The proposed RWI structure would be located on the coastal side of the ICW across the waterway from the Brazoria National Wildlife Refuge (see figure 2.4.6-3). The RWI structure is located about 6 miles (9.6 kilometers) southeast of the proposed storage site. DOE also would construct a 1,000-foot (300-meter) long new access road from Bay Street to the RWI.

Plants, Wetlands, and Wildlife

The ICW is a heavily traveled maritime corridor that is dredged regularly by USACE to maintain a proper depth for navigation. It is a tidally influenced and channelized system. The vegetation near the proposed structure is estuarine wetlands, dominated by saltmeadow cordgrass and other salt-tolerant emergent wetland species. Typical vegetation in this area includes saltgrass, seamyrtle, glasswort, and spikerush. No submerged aquatic vegetation grows along the ICW in the vicinity of the proposed RWI. Estuarine wetlands provide habitat for a variety of birds, mammals, and reptiles, including herons, spoonbills, swamp rabbits, mice, and various turtles.

The aquatic fauna found near the RWI is similar in composition to the animals described for the RWI pipeline, brine disposal pipeline, and power line ROW. Over 130 species may inhabit the ICW, which includes representatives from 40 families that are common throughout the Gulf Coast region (Page and Burr 1991; Froese and Pauly 2006; Hoese and Moore 1998; McGowan et al. 1998). Two species of commercially important shrimp are found in the estuarine systems along the ICW and the area in and around the proposed RWI.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed RWI would be located: bald eagle, brown pelican, piping plover, whooping crane, and several marine mammals and sea turtles.

A review of the conditions at the proposed RWI structure and access road and consultations with the USFWS and the Texas Parks and Wildlife Department revealed that the area may provide some suitable habitat for the federal and state-listed threatened bald eagle (see appendix H). There are no known bald eagle nests located near the proposed RWI site and access road, but open water and emergent wetland habitat in the area may be suitable for foraging bald eagles.

Appendix I identifies the species listed as threatened or endangered by the State of Texas (but are not on the federal list) in the counties in the proposed Stratton Ridge development area. Table 3.7.8-3 shows a comparison of the habitat preferences of threatened or endangered species on the state list and habitat present at the proposed Stratton Ridge RWI. None of these species is known to inhabit the site, but a survey or habitat assessment has not been conducted.

Table 3.7.8-3: State-Listed Species With Potentially Suitable Habitat At Stratton Ridge RWI

Common Name	State Status	Global Status ^a	Potentially Suitable Habitat at Site
Arctic peregrine falcon	Threatened	Apparently secure (G4)	Estuarine wetlands
Eastern brown pelican	Endangered	Apparently secure (G4)	Estuarine wetlands
Reddish egret	Threatened	Apparently secure (G4)	Estuarine wetlands
Sooty tern	Threatened	Secure (G5)	Estuarine wetlands
White-faced ibis	Threatened	Secure (G5)	Bayous and palustrine wetlands
White-tailed hawk	Threatened	Apparently secure (G4)	Estuarine wetlands dominated by saltmeadow cordgrass
Wood stork	Threatened	Apparently secure (G4)	Bayous and palustrine wetlands
Alligator snapping turtle	Threatened	Vulnerable G3)	Water bodies, particularly slow moving, deep rivers and canals; shallow tributaries; and brackish waters (estuarine) near river mouths

Notes:

^a Secure is defined by NatureServe and the Texas Natural Diversity Database as common, widespread, and abundant. Apparently secure is defined as an uncommon species, but not rare. There is some cause for long-term concern. Vulnerable is defined as at moderate risk of extinction due to range restrictions and relatively few populations (80 or fewer).

Source note: Natureserve 2005

Essential Fish Habitat

No EFH, as described in appendix E, is located within or near the boundaries of the proposed RWI.

Special Status Areas

The proposed RWI site would be located along the shoreline of the ICW across from the border of the Brazoria National Wildlife Refuge. The refuge is described in detail in section 3.7.2.

3.7.8.1.4 Texas City Terminal

Plants, Wetlands, and Wildlife

The proposed 39-acre (16-hectare) terminal would be adjacent to an existing terminal owned by TEPPCO and southwest of larger refineries owned by British Petroleum, MAP, and VALERO. The site currently contains fields that do not appear to be actively managed, although they appear to have been used for row-crop agriculture in the past. Highways flank the western and southeastern borders of the proposed site. Row-crop agriculture, pasture fields, and residential neighborhoods are the other land uses surrounding the proposed terminal site. National Wetlands Inventory data identified 12 acres (5 hectares) of palustrine emergent, forested, and scrub-shrub wetland habitat at the proposed site. These wetlands are associated with a drainage channel that originates northwest of the proposed site boundary and flows east

through the site. Because of the disturbed nature of the site and of the surrounding area, the site likely provides marginal quality habitat for wildlife.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Texas City terminal would be located: Attwater's greater prairie chicken, brown pelican, Eskimo curlew, piping plover, and several marine mammals and sea turtles. A review of the conditions at the Texas City terminal revealed that the proposed site that would be disturbed does not provide suitable habitat for any federally or state-listed threatened or endangered species, species proposed for listing, or candidate species (see appendices H and I).

Special Status Areas

No special status areas are located within the boundary of the proposed Texas City terminal. An active interior least tern and foster's tern rookery is located about 1.6 miles (2.7 kilometers) southeast of the proposed terminal site (USFWS 2004—Texas Colonial Waterbird Database).

Essential Fish Habitat

No EFH is located near or within the boundaries of the proposed Texas City terminal.

3.7.8.2 Impacts

3.7.8.2.1 Stratton Ridge Storage Site and Associated Infrastructure

Plants, Wetlands, and Wildlife

The clearing, filling, and grading associated with the proposed construction of the Stratton Ridge storage site would affect approximately 370 acres (150 hectares), including the 270-acre (110-hectare) storage site and a 300-foot (91-meter) cleared security buffer surrounding the site. Trees would be removed within the 300-foot security buffer; however, emergent wetland vegetation would be allowed to regrow postconstruction. The construction would affect the following:

- 258 acres (104 hectares) of palustrine-forested wetlands,
- 35 acres (14 hectares) of deciduous forest,
- 23 acres (9 hectares) of palustrine-emergent wetlands,
- 12 acres (5 hectares) of palustrine scrub and shrub, and
- 45 acres (18 hectares) of old field and roads.

Clearing and grading the palustrine forested wetlands would permanently remove and fill about 192 acres (78 hectares) of forested wetlands onsite and convert 66 acres (27 hectares) within the security buffer to emergent wetlands or open water. If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible, although the entire footprint would be cleared of trees for security reasons. The placement of fill in the wetlands would cause a permanent loss of wetlands functions and values; however, clearing forested wetlands outside the facility footprint would represent only wetland conversion and some wetland functions would be preserved. Section 3.7.2 and appendix B describe the effects of clearing and filling wetlands in detail. Although the area is disturbed by cattle and feral pigs and contains tallowtrees, the palustrine forested wetlands remain an important ecological resource for the region. Palustrine emergent wetlands occur more frequently in the region than forested

wetlands; however, because the emergent wetlands are associated within the forested wetlands, the habitat combination is more ecologically valuable for the region.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and would preserve onsite emergent wetlands to the maximum extent practicable. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.1.2 and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Texas Commission on Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts. If this alternative is selected, the impact to this ecologically important and relatively rare wetland type may be an adverse affect, which would be mitigated somewhat by DOE's compensation plan for jurisdictional wetland impacts.

As discussed in section 3.7.2, some wildlife would be killed or displaced to surrounding areas during construction. Because the forested wetland habitat is uncommon in the region, some wildlife species may be unable to find suitable habitat, including migrating neotropical birds that use the palustrine forested wetlands—specifically bottomland hardwood forests—as stopover habitat. Although some individuals would be affected, the impact would not alter the state population or species viability. Construction of the Stratton Ridge storage facility would reduce the quantity of forested habitat available to these birds, which would add to the stress of annual migration. Generally, common animals such as white-tailed deer and nine-banded armadillo would be able to find suitable habitat in the surrounding area. After the security fencing is constructed, wildlife use of the facility would be limited. Some mobile species and birds would probably still visit the site.

The operations and maintenance effects, described in section 3.7.2, would preclude wildlife sensitive to human disturbance from entering the area. These would either adapt to the disturbance or move to new habitat; however, only a small amount of the forested wetland habitat would remain near the proposed Stratton Ridge site. The remaining forested wetland habitat would probably not support all the displaced wildlife species that are sensitive to human disturbances. Most common species (e.g., deer, armadillo, and feral pigs) could tolerate noise and activities created by the SPR facility.

The common operational and maintenance effects on migratory birds described in section 3.7.2 could hinder migration due to night lighting, noise, and new structures; however, the proposed Stratton Ridge site already is traversed by large power lines and is adjacent to a cellular telephone tower.

With the removal of semipermanent water bodies and temporary increases in erosion, the proposed construction of the Stratton Ridge site facilities could affect aquatic species such as amphibians, reptiles, and invertebrates, and is also described in section 3.7.2. Although some individuals would be affected, the state population and species viability would not be altered.

As described in section 2.3, DOE would minimize erosion by using best management practices. An erosion- and sediment-control plan and a Texas Pollutant Discharge Elimination System stormwater permit issued by the Texas Commission on Environmental Quality for construction activities would be secured, which would require the use of best management practices to minimize the impact to water bodies.

Mitigation: DOE would implement a plan to control Chinese tallowtree invasion on the site. DOE would control invasive species by using seed mixes devoid of exotic and

invasive species and through postconstruction monitoring of the disturbed areas. If the monitoring detected problems with invasive species, DOE would implement corrective action. DOE would continue to refine the conceptual site plan to avoid and minimize impacts to the maximum extent practicable.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Mitigation: DOE, in cooperation with USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. DOE would use down-shielded and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. If this alternative is selected, DOE would conduct a survey for raptor nests and secure any necessary permits in accordance with USFWS requirements under the Migratory Bird Treaty Act.

Special Status Species

A pair of bald eagles is known to nest near Ash Lake, located approximately 1.8 miles (2.7 kilometers) northwest of the proposed Stratton Ridge site. The bald eagle is federally listed as threatened but has been proposed for delisting by the USFWS. Research has shown that most nests are not disturbed by development activities that are farther than 0.25 miles (0.4 kilometers) away. Although this nest location is farther than 0.25 miles from the proposed site and the site is not designated critical habitat, these bald eagles may be affected by the Stratton Ridge development because some habitat at the proposed site may provide suitable foraging area. DOE has determined that the bald eagle would not likely be adversely affected by the proposed site. Although there are no known bald eagle nests in the Stratton Ridge site, the bottomland hardwood forest and wetland habitat at the site may be suitable for nesting, foraging, or roosting habitat. Bald eagles are particularly sensitive to human activity when they nest in Texas from October to July; their peak egg laying occurs in December and eggs hatch in January (Wiener 2005).

Operations and maintenance activities at the site would not affect foraging bald eagles even though bald eagles are highly sensitive to human noise and interference (USFWS 1983; USFWS 1995). Once construction is complete, the SPR storage sites would not generate significant noise or activity; therefore, the facility should not interfere with roosting or foraging activity.

If the proposed Stratton Ridge site is selected for development, a biologist would survey the site for bald eagle nests and any state-listed species that are deemed to have suitable habitat or potential to inhabit the area. DOE would coordinate with USFWS and the Texas Parks and Wildlife Department if any protected species are observed or suitable habitat is determined to be present onsite. DOE would conduct formal Section 7 Consultation if any part of the project was determined to adversely affect the bald eagle.

Essential Fish Habitat

No EFH exists within or near the boundaries of the proposed site and no impact to EFH would occur.

Special Status Areas

The special status areas near the proposed storage site—Brazoria National Wildlife Refuge, Peach Point Wildlife Management Area, and San Bernard National Wildlife Refuge—are all located more than 3.5 miles (5.6 kilometers) from the proposed storage site boundaries. Because the impacts associated with Stratton Ridge construction and operations and maintenance would be localized, DOE does not expect any impacts on special status areas.

3.7.8.2.2 Stratton Ridge Rights-of-Way

Plants, Wetlands, and Wildlife

Construction in the pipeline and power line ROWs would result in clearing all the vegetative habitats in the ROW and would affect the following:

- 373 acres (151 hectares) of hardwood forest,
- 40 acres (16 hectares) of grassland and scrub and shrub habitat,
- 11 acres (4 hectares) of water and emergent wetlands,
- 124 acres (50 hectares) of sand flats and beach habitat, or bare soil, and
- 140 acres (33 hectares) of disturbed or managed land.

Using the USFWS National Wetlands Inventory maps and proposed ROW footprints, construction could affect the following:

- 85 acres (34 hectares) of estuarine,
- 169 acres (68 hectares) of palustrine-emergent wetlands,
- 25 acres (10 hectares) of palustrine-unconsolidated bottom wetlands,
- 2 acres (1 hectare) of palustrine-scrub shrub wetlands,
- 3 acres (1 hectare) of lacustrine wetlands, and
- 3 acres (1 hectare) of riverine wetlands.

About 78 percent of these corridors would follow existing ROW corridors, which have already been disturbed by previous construction and ongoing maintenance activities.

As discussed in section 3.7.2, approximately 33 to 40 percent of this footprint would be a permanent impact because it would be located within the permanently maintained easement. The vegetation within the construction easement would be cleared, but DOE would regrade to pre-construction contours and reseed with native species within this area to re-establish native habitat. The remaining area within the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be regraded to preconstruction conditions and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands, and the nature and amount of wetland impact from the permanent and construction easements. In addition, many of these wetlands would be avoided by directional drilling from the adjacent uplands. Moreover, about 80 percent of the pipeline ROWs is within or parallel to an existing ROW. Use of existing ROW corridors to the maximum extent practicable would minimize the impacts to undisturbed communities and wildlife.

Because DOE aggregated the Texas GAP Analysis Program information to identify upland habitat, some of the National Wetlands Inventory acreage is included under other land classifications, such as hardwood forest and scrub and shrub vegetation.

Section 3.7.2 describes the ROW operations and maintenance common impacts.

DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in accordance with the Section 404/401 permit conditions, which would compensate for the jurisdictional wetland impacts.

As stated in section 3.7.2, construction in the ROWs would displace or kill some aquatic and terrestrial wildlife. Noise and human activity may temporarily preclude some organisms from using nearby habitat. The duration of construction in these areas would be short (6 to 10 weeks at any one location), and ample

habitat would be available nearby for most species. The aboveground portion of the power lines to the RWI, from the site to the Brazoria National Wildlife Refuge, represents a potential strike hazard that could affect resident and migratory birds (as described in section 3.7.2). The buried portion of the power lines through the refuge to the RWI would not affect resident or migratory birds.

The impacts associated with the operations and maintenance of the ROWs are described in section 3.7.2.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters] wide) or in areas containing sensitive habitat such as wetlands or habitat for special status species. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

DOE would bury the power lines through the Brazoria National Wildlife Refuge. In areas outside the refuge, DOE would use low power line poles (less than 75 feet [23 meters]) and would follow the guidelines outlined in *Suggested Practices for Raptor Protection on Powerlines: the State of the Art in 1996* (APLIC 1996).

Special Status Species

The construction of the RWI and brine disposal pipelines and power lines leading to the RWI structure may affect habitat that is potentially suitable for foraging and nesting bald eagles; however, no known nests have been identified along the ROW. It is also possible that habitats may exist for bald eagle nesting and foraging along the existing pipeline ROW to Texas City; however, the ROW currently exists and is actively managed by DOE.

Construction activities along the ROWs may affect potential habitat for species that are listed as threatened or endangered by Texas, but that are not on federal lists. Although arctic peregrine falcons may feed along the RWI and brine disposal ROWs that cross through estuarine wetlands, they should be able to find other areas of potential habitat adjacent or nearby. The estuarine wetlands and beach habitat along the ROWs are potentially suitable to reddish egrets, sooty terns, and white-tailed hawks. The forested habitat along the ROWs is potentially suitable habitat for nesting and foraging swallow-tailed kites; the fresh-water marsh (palustrine emergent wetlands) and other wetland habitats are potentially suitable to nesting white-faced ibis and wood storks. Construction could affect potential habitat for the smooth green snake, although most of the corridors are already disturbed. Pipeline construction could disturb alligator snapping turtle habitat located near the ICW, though the footprint of the RWI and pipeline would be small and disturbance temporary.

As described in section 3.7.2, ROW operations and maintenance activities would occur infrequently and should not impact state-listed species.

If DOE selects the Stratton Ridge site for development, a biologist would survey the area for eagles and suitable eagle habitat along the ROWs. If a nest is identified, DOE would initiate formal Section 7 Consultation with USFWS and consult with the Texas Parks and Wildlife Department. DOE would prepare a Biological Assessment if any portion of the project may adversely affect the bald eagle. DOE would implement appropriate mitigation strategies to avoid adverse affects. For example, construction of the pipeline could be completed to avoid nesting times where bald eagles are particularly sensitive to

human activity. DOE would directionally drill under the sand beaches along the coast to avoid potential habitat for the brown pelican.

Mitigation: DOE would minimize construction activities during nesting periods to the extent practicable to minimize the impact on local nesting bird populations.

Essential Fish Habitat

No EFH occurs near or within the ROWs for the Stratton Ridge pipelines and utilities.

Special Status Areas

Approximately 3 miles (5 kilometers) of the proposed ROW containing the RWI and brine disposal pipelines and the two power lines to the RWI would cross the Brazoria National Wildlife Refuge. In addition, 4.7 miles (7.6 kilometers) of the crude oil pipeline to Texas City would cross the refuge along its northern border adjacent to the existing Bryan Mound pipeline ROW. As described earlier, the construction through the refuge would temporarily affect wildlife and vegetation present in the refuge. After construction, the emergent wetlands and upland plant communities within the temporary construction easement would be allowed to revegetate and wildlife could move back into the ROW.

As described in section 3.7.2, ROW operations and maintenance activities such as mowing, clearing, and grubbing would occur infrequently and result in temporary impacts on vegetation and wildlife.

Mitigation: Because the Brazoria National Wildlife Refuge contains important habitat for migrating birds and waterfowl, DOE would avoid or minimize pipeline construction during spring or fall migration. As described in section 2.3, DOE would bury the power lines through the refuge to the RWI to further minimize long-term impacts on vegetation and wildlife. DOE would use the existing Bryan Mound ROW as much as possible for pipeline and staging areas to minimize the footprint of the crude oil pipeline through the refuge. DOE would coordinate with USFWS for the easement through the wildlife refuge and would reseed ROWs with seeds of native herbaceous, shrub, and/or tree species to promote regeneration of habitat in the temporary construction easement and restore the permanent easement to preconstruction contours. Disturbed areas would be restored with herbaceous species.

3.7.8.2.3 Raw Water Intake

Plants, Wildlife, and Wetlands

Section 3.7.2 describes construction impacts associated with the proposed RWI. The clearing and grading associated with construction of the RWI and access road would affect approximately 2 acres (1 hectare) of estuarine emergent wetlands. The RWI structure itself would occupy an area of 2 acres (1 hectare). DOE would secure permits from USACE and the Texas Commission on Environmental Quality for the impact to jurisdictional waters of the United States and would provide compensation for the unavoidable impacts. This would include an Industrial Water Conservation Plan from Texas Commission on Environmental Quality for the proposed use of surface water.

As discussed in section 3.7.2, some wildlife species would be displaced to similar vegetative and wetland communities surrounding the RWI and the access road. Dredging required for construction of the RWI may affect some aquatic organisms and temporarily increase suspended sediment in the water column. Mobile species could move away from the construction area. Because the ICW is an artificial navigation

channel that is regularly dredged by USACE to maintain sufficient depth and width for boat traffic, most aquatic species would be tolerant of noise and human activity. Prior to construction, DOE would conduct surveys for raptor nests as typically required by the Migratory Bird Treaty Act.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands to the maximum extent practicable. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid and minimize and compensate for wetland impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.2 and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and Texas Commission on Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the wetland impacts. As presented in chapter 2, erosion would be minimized with the use of best management practices. An erosion- and sediment-control plan and TPDES stormwater permit issued by Texas Commission on Environmental Quality for construction activities would be secured, which would require the use of best management practices to minimize the impact to water bodies.

The RWI would withdraw about 1.0 MMBD (42 million gallons per day) from the ICW for a period of 4 to 5 years during solution mining and afterwards for periodic drawdown or cavern maintenance. Because the ICW is a tidal channel, the withdrawal would not affect the river depth or flows; however, it would cause impingement and entrapment of some fish and other small aquatic organisms. The RWI would be equipped with intake screens, a relatively low intake velocity, and a traveling screen and fish bypass system to return impinged fish back to the waterway. Entrained organisms would not have an outlet or bypass. Operations and maintenance of the RWI would produce constant noise from the pumps during the cavern solution mining and periods of fill and drawdown. Noise from the RWI is estimated to be audible up to 0.7 miles (1.2 kilometers) away if noise attenuation is not used and would dissipate with increasing distance from the structure. Noise could preclude sensitive terrestrial and aquatic wildlife from using habitat in the immediate vicinity of the RWI. The proximity of the Brazoria National Wildlife Refuge to the RWI is of particular concern to the USFWS because the refuge contains habitat for hundreds of wildlife species and provides important stopover habitat for migratory birds. Because the noise produced by the RWI would be constant, however, some organisms might adapt to the background operations of the facility.

Section 3.7.2 describes other operations and maintenance impacts, including artificial lighting and increased human activity, that could affect migratory birds and other wildlife.

Mitigation: As described in section 3.7.2, DOE would use down-shielded lights and low-mast security lighting to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE, in cooperation with USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year.

Because the wildlife refuge would be in close proximity to the RWI, DOE would mitigate the noise impacts by using noise attenuation measures. These measures would include building a concrete enclosure for the pumps and install quieter pump equipment. The use of these strategies would decrease the noise impact and may achieve up to 10 A-weighted decibel (dBA) noise reduction.

Special Status Species

Operations and maintenance activities at the RWI may affect foraging bald eagles because they are sensitive to human noise and interference (USFWS 1983, 1995).

No known brown pelican nests are located near the proposed location for the RWI structure; therefore, the construction, operations, and maintenance of the RWI structure would not affect brown pelicans.

Construction of the RWI could affect potential habitat for species that are listed as threatened or endangered by the State of Texas, but are not on federal lists. Although nesting sites are not likely to be adjacent to the busy ICW, the habitat near the RWI may be suitable for feeding arctic peregrine falcons, reddish egrets, sooty terns, white-tailed hawks, white-faced ibis, and wood storks. As described in section 3.7.2, construction noise and activities may displace these species or affect their behavior. During construction, alligator snapping turtles may be displaced and forced to use suitable adjacent habitat. DOE does not expect that the proposed construction or operation of the RWI would cause a taking of a state-listed species.

Operations and maintenance of the RWI during cavern fill and drawdown activities would produce constant noise that may affect nearby threatened and endangered birds on state lists (e.g., arctic peregrine falcons, eastern brown pelicans, reddish egrets, sooty terns, white-tailed hawks, white-faced ibis, wood storks). These species could move to similar habitat in the wildlife refuge. Operation of the RWI is not expected to affect the threatened alligator snapping turtle species on the state list because the intake pipe would be equipped with screens and have intake flow velocities that are sufficiently slow that will allow larger organisms such as the turtles to escape.

Mitigation: To the extent practicable, DOE would minimize impacts by constructing the RWI outside important nesting periods and spring and fall bird migration.

Mitigation: Section 3.7.2 describes how DOE would use down-shielding and low-mast security lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE also would use noise attenuation measures, such as pump enclosures, and low-noise pumps to minimize impacts on wildlife.

Essential Fish Habitat

No EFH is located within or near the RWI structure.

Special Status Areas

As described in section 3.7.2, construction noise and activities may affect sensitive wildlife species that use the Brazoria National Wildlife refuge. These impacts may displace sensitive species and may affect foraging and breeding behavior of other organisms. Mobile species may move away from the disturbance to suitable, available habitat elsewhere in the refuge.

Noise from operations and maintenance of the RWI during and following cavern construction could affect wildlife within the refuge. These impacts may displace some sensitive species and may affect foraging and breeding behavior in others. Mobile species would move away from the disturbance to suitable, available habitat elsewhere in the refuge.

Mitigation: Because the Brazoria National Wildlife Refuge provides important habitat for migratory birds, DOE would minimize or avoid construction of the RWI during

nesting periods and spring and fall migration. DOE would down-shield lights to minimize the impacts of artificial light on migratory birds and other wildlife. DOE would use noise attenuation for the pump station to minimize impacts on wildlife.

3.7.8.2.4 Texas City Terminal

Plants, Wetlands, and Wildlife

The clearing, grading, and construction of the Texas City terminal would affect about 39 acres (16 acres). Almost 100 percent of the proposed site contains disturbed habitat. The following wetlands would be removed during construction:

- 4 acres (2 hectares) of palustrine emergent wetlands,
- 2 acres (1 hectare) of palustrine forested wetlands,
- 4 acres (2 hectares) of palustrine scrub-shrub wetlands, and
- 1 acre (0.4 hectares) of palustrine unconsolidated bottom.

If this alternative is selected, DOE would refine the conceptual site plan to avoid some of the wetlands if possible, although the entire footprint would be cleared of trees for security reasons. The placement of fill in the wetlands would cause a permanent loss of wetland functions and values. DOE would secure permits from USACE and the Texas Commission on Environmental Quality for the impact and would provide compensation for the unavoidable wetland impacts. Section 3.7.2 describes the effects of clearing and filling wetlands in detail.

After the security fencing is constructed, wildlife use of the site would be limited, though some mobile species and birds would probably still visit the site.

The operations and maintenance activities, described in section 3.7.2, may preclude wildlife sensitive to human disturbance from entering the area. The operational and maintenance activities at the terminal would be infrequent and similar to activities at the adjacent terminal to the proposed terminal and the refineries nearby. Therefore, this area has already been disturbed by past construction and habitat fragmentation.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Special Status Species

A review of the conditions at the Texas City terminal revealed that the proposed site that would be disturbed does not provide suitable habitat for any federally or state-listed threatened or endangered species, species proposed for listing, or candidate species (see appendices H and I).

Special Status Areas

No special status areas are located within the boundaries of the proposed Texas City terminal. Construction and operations and maintenance activities would not affect the least tern rookery because the proposed facility is located more than 1.5 miles (2.4 kilometers) away from the nesting area.

Essential Fish Habitat

No EFH exists near or within the boundaries of the proposed Texas City terminal.

3.7.9 Bayou Choctaw Expansion Site

This section addresses the following areas:

- The proposed Bayou Choctaw expansion and associated facilities;
- One proposed pipeline ROW from the existing brine injection wells to the proposed new brine injection well field; and
- The proposed six new brine injection wells and associated infrastructure.

The brine disposal system would be upgraded by installing 3,000 feet (900 meters) of brine pipeline to connect six new injection wells to the existing brine injection wells located south of the property boundary. The existing RWI on Cavern Lake would be used and would operate within the capacity of the existing system. The use of RWI would not change the existing condition or affect biological resources and is not considered in this analysis.

3.7.9.1 Affected Environment

3.7.9.1.1 Bayou Choctaw Expansion Storage Site

The proposed expansion at Bayou Choctaw involves development of two new caverns as well as acquisition of an existing commercial storage cavern that is already located within the property boundary. There would be only minor changes to the current footprint or operations from the facility upgrades required for expansion. No new offsite land acquisition is required for the Bayou Choctaw expansion.

Plants, Wetlands, and Wildlife

The Bayou Choctaw storage site is located in Iberville Parish, LA. The storage site occupies 356 acres (144 hectares) of fresh-water swamp (palustrine deciduous wetlands) with open water canals that join larger bodies of water offsite (DOE 2004f). The area surrounding the site is also fresh-water swamp. Bald cypress and water tupelo are the main canopy vegetation; understory vegetation includes black willow, water ash, and pumpkin ash. Dry hummocks around tree roots are vegetated with greenbriar, palmetto, blackberry, trumpet vine, Virginia creeper, holly, and grape. One-third of the storage site property (caverns and support infrastructure) has been filled and elevated. The facility is protected from flooding by flood control levees and pumps. The remainder of the site, which includes the area where the new caverns would be placed, is a fresh-water swamp with areas of open water. The site was affected by recent hurricanes, but the plant communities were not significantly damaged.

The swamp provides habitat for a diverse wildlife population, including many kinds of birds, mammals, reptiles, and amphibians. Common bird species found in the area include herons, egrets, woodpeckers, wood duck, woodcock, thrushes, vireos, and warblers. The bald cypress trees in the area provide suitable nesting and wintering habitat for other bird species. Mammals expected to be found at Bayou Choctaw include opossum, squirrels, nutria, mink, raccoon, swamp rabbit, and white-tailed deer.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the Bayou Choctaw storage site is located: bald eagle, pallid sturgeon, and Louisiana black bear. However, following a review of conditions and consultations with USFWS and the Louisiana Department of Wildlife and Fisheries, DOE has determined that the expansion of the Bayou Choctaw site would not provide suitable habitat for any federally or state-listed threatened, endangered, or candidate species (see appendices F and I).

Special Status Areas

No special status areas are located within 2 miles (3 kilometers) of the Bayou Choctaw expansion site.

3.7.9.1.2 Bayou Choctaw Rights-of-Way

Plants, Wetlands, and Wildlife

- A proposed brine disposal pipeline ROW would extend south for 0.6 miles (0.9 kilometers) from the existing Bayou Choctaw brine injection wells to the proposed new brine injection wells.

The entire proposed ROW between the existing and new brine injection wells would cross palustrine forested wetlands. The vegetative composition within the area of the proposed ROW is likely similar to that of the Bayou Choctaw facility, with bald cypress and water tupelo as the main canopy species. Similar wildlife would be present in the area of the proposed ROW as mentioned above in the description of the proposed expansion area.

The cypress-tupelo swamp is an important fresh-water ecosystem that provides important functions such as nutrient transformation, flood storage, and habitat for wildlife. Wetlands reduce the impact of nonpoint source pollution, minimize flood surges, and provide economic value to the community. Forested wetlands near the Bayou Choctaw salt dome and in other areas along the Gulf Coast provide important stopover habitat for migrating birds. The area likely supports numerous bird species that are regulated by the Migratory Bird Treaty Act.

Forested wetlands in the vicinity of the proposed brine disposal pipeline and existing brine injection wells, as in other places in Louisiana, are experiencing pressure from other land uses in the area. Abutting the proposed ROW to the east are drained fields used for row-crop agriculture. Oil and gas development also and wetland communities exist west of the proposed brine ROW.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Bayou Choctaw ROWs would cross: bald eagle, pallid sturgeon, and Louisiana black bear. However, after consultation with USFWS and the Louisiana Department of Wildlife and Fisheries, DOE has determined that the proposed ROWs would not affect any federally or state-listed threatened, endangered, or candidate species (see appendices F and I).

Special Status Areas

There are no special status areas located within or near the proposed brine disposal ROW.

3.7.9.1.3 Bayou Choctaw Brine Injection Wells

Plants, Wetlands, and Wildlife

DOE has identified a 96-acre (39-hectare) area approximately 2 miles (3.2 kilometers) south of the Bayou Choctaw storage site to construct up to six new brine injection wells and associated infrastructure. Ninety-five percent of this proposed area contains palustrine forested wetlands that likely have a similar vegetative composition as the bald cypress-tupelo swamp at the Bayou Choctaw storage site. DOE would use at most approximately 20 acres (8 hectares) for the brine injections wells and access road. This analysis assumes that all 20 acres (8 hectares) contain palustrine forested wetlands.

As stated previously, the cypress-tupelo swamp is an important fresh-water ecosystem that provides important functions such as nutrient transformation, flood storage, and habitat for wildlife. These ecosystems are experiencing serious development pressure from agriculture and the oil and gas industries near the Bayou Choctaw storage facility and in other areas within Louisiana.

This cypress-tupelo swamp in the area of the proposed brine injection wells likely supports similar wildlife as described above with the Bayou Choctaw site.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Bayou Choctaw injection wells would be located: bald eagle, pallid sturgeon, and Louisiana black bear. However, after reviewing the area and consultations with USFWS and the Louisiana Department of Wildlife and Fisheries, DOE has determined the brine injection wells would not affect any federally or state-listed threatened, endangered, or candidate species.

Special Status Areas

There are no special status areas located within or near the proposed brine injection wells.

3.7.9.2 Impacts

3.7.9.2.1 Bayou Choctaw Expansion Site

Plants, Wetlands, and Wildlife

The construction activities associated with the proposed site expansion would fill about 4 acres (2 hectares) of fresh-water swamp. Construction of the two proposed caverns and construction of each new and replacement road to access the caverns would fill about 4 acres (1.6 hectares). The impacts of clearing and filling wetlands are described in section 3.7.1.2. The affected area at Bayou Choctaw would be located within the previously disturbed site boundaries. The loss of vegetation and the fill of wetlands would displace wildlife that nest and forage in the surrounding area.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands to the maximum extent practicable. Due to the engineering limitations with the cavern placement in the salt dome, under this alternative some wetlands would be affected. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in section 3.7.1.2 and in accordance with the

404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

Because of the small facility footprint and disturbed nature of the plant communities the expansion would cause little affect to wildlife, wetlands, plant communities, or migratory birds. Some wildlife would be killed or displaced by construction activities. These organisms would be displaced to similar areas within and surrounding the facility. Though these impacts may affect individual organisms, the construction, operations, and maintenance of the facility would not alter the regional population or species' viability.

Construction of the Bayou Choctaw site facilities would affect aquatic and terrestrial species that use the cypress swamp, such as some beavers, amphibians, small reptiles, and fish. The connecting wetlands offsite would experience sedimentation and temporary water impacts as the site's vegetation is removed and the surrounding wetlands filled. Aquatic organisms would have to find suitable aquatic habitat in the adjacent wetlands or other wetlands nearby.

Section 3.6.1.3 discusses operational and maintenance impacts common to all proposed new and expansion sites. The general operations and maintenance of the site, such as lawn maintenance, lighting, noise, and vehicular traffic in and around the facility, would be the same as current activities; therefore, there would be no impact to vegetation or wildlife communities in the area.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Mitigation: DOE, in cooperation with USFWS, would mitigate impacts on migratory birds that frequent the area during the year. DOE would use down-shielding and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. DOE would conduct a survey for raptor nests and secure any necessary permits in accordance with USFWS requirements under the Migratory Bird Treaty Act.

Special Status Species

DOE has determined that no federally or state-listed threatened, endangered, or candidate species would be affected by the proposed site expansion.

Special Status Areas

There are no special status areas located within or near the proposed expansion area of the Bayou Choctaw storage facility.

3.7.9.2.2 Bayou Choctaw Rights-of-Way

Plants, Wetlands, and Wildlife

Construction of the brine pipeline ROW would result in clearing 10 acres (4 hectares) of palustrine forested wetlands. As discussed in section 3.7.2.1, approximately 33 to 40 percent of this footprint would be a permanent impact because it is located within the permanently maintained easement. The vegetation within the construction easement would be cleared, but DOE would regrade to pre-construction contours and reseed with native species within this area to re-establish native habitat. The area within the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be regraded to preconstruction conditions and allowed to regenerate to emergent

wetlands. Appendix B provides detailed information about the types of wetlands, and the nature and amount of wetland impact from the permanent and construction easements.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in the Common Impacts section (see section 3.7.1.2) and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts. In areas temporarily disturbed during construction, DOE would re-establish vegetation communities with native wetland species.

As stated in section 3.7.2, construction in the ROWs would displace or kill some aquatic organisms and terrestrial wildlife. Noise and human activity may temporarily preclude some organisms from using nearby habitat. The duration of construction through these areas would be short (6 to 10 weeks at any one location) and ample habitat would be available nearby for most species.

The impacts associated with the operations and maintenance of the ROWs are described in section 3.7.2.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. It would correct problems that are identified.

Special Status Species

DOE has determined that no federally or state-listed species would be affected by the proposed ROW.

Special Status Areas

There are no special status areas located in or near the proposed ROW.

3.7.9.2.3 Bayou Choctaw Brine Injection Wells

Construction of the brine injection wells would clear and fill up to 20 acres (8 hectares) of palustrine forested wetlands. The actual construction and the permanent footprint of the six brine injections wells and connecting pipelines may be smaller than the area presented in this analysis. DOE, however, is still revising the site plan for the injection well area. Placing fill in wetlands would cause a permanent loss of wetland functions and values.

The removal of trees and other vegetation for the brine injection well pads, connecting pipelines, and access roads would create open areas where there was relatively continuous forested wetlands. Clearing of forested areas for the connecting brine disposal pipelines would represent a wetland conversion because DOE would allow emergent wetland vegetation to regenerate in the area.

If this alternative is selected, DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and would preserve onsite emergent wetlands to the maximum extent practicable. DOE would submit a joint permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid and minimize and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in the Impacts Common to Multiple Sites section (section 3.7.1.2) and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

The development of the site would change wetland species composition and have long-term impacts on surrounding plant and animal communities by introducing edge habitat within a relatively large continuous flooded forested area. The operations and maintenance effects, such as noise created by the brine injection wells, would preclude wildlife sensitive to human disturbance from entering the area. These effects are described in section 3.7.2. Generally, any displaced organisms would find sufficient habitat in the surrounding area. Security fencing around the well pads would limit wildlife access to the cleared habitat. Some mobile species and birds may still have access to areas surrounding the brine injection wells.

The fill of inundated wetland areas would temporarily increase erosion and could affect aquatic species such as fish, amphibians, and invertebrates as described in section 3.7.2. As described in section 2.3, DOE would minimize erosion by using best management practices.

Mitigation: DOE would control invasive species by using seed mixes devoid of exotic and invasive species and through postconstruction monitoring of the disturbed areas. If the monitoring detects problems with invasive species, DOE would implement corrective action. DOE would continue to refine the conceptual site plan to avoid and minimize impacts to wetlands to the maximum extent practicable.

Special Status Species

DOE has determined that no federally or state-listed threatened, endangered, or candidate species would be affected by the proposed brine injection wells.

Special Status Areas

There are no special status areas located within or near the proposed brine injection wells.

3.7.10 Big Hill Expansion Site

This section addresses the following areas:

- The proposed expansion area for the existing Big Hill storage site; and
- Two proposed pipeline ROWs: the addition of an adjacent crude oil pipeline next to the existing ROW of the Big Hill to Sun Terminal in Nederland, TX, and the refurbishment of the existing brine disposal pipeline.

The Big Hill storage site has most of the infrastructure in place to facilitate construction and operation of additional caverns as described in section 2.3.3. The existing RWI on the ICW would be used and

withdrawal would be within existing permitted limits of the Industrial Water Conservation Plan. DOE would replace two RWI pumps within the structure without expanding the facility footprint. The use of the RWI for the expansion would not change existing biological conditions of the ICW; therefore, the operation of the RWI system is not considered in this analysis. Because of the similarity among the proposed SPR facilities in offshore environment, operations, and maintenance of the brine diffuser, the discussion of the brine diffusion system for all proposed storage facilities is covered in section 3.7.2 and appendix E. Also due to these similarities, the discussion of EFH is contained in section 3.7.2 and in appendix E.

3.7.10.1 Affected Environment

3.7.10.1.1 Big Hill Expansion Storage Site

Plants, Wetlands, and Wildlife

The Big Hill expansion site (see figure 2.5.2-1) is located in the Oak-Prairie Wildlife District in the Texas Gulf Coast Prairie Ecoregion (TPWD 2005); the existing site covers approximately 250 acres (101 hectares). The proposed 210-acre (83 hectare) Big Hill expansion area would include a 59-acre (24-hectare), 300-foot (91 meter) perimeter security buffer. The area is comprised of upland habitat characterized by a hardwood forest that is in the later stages of secondary succession. Historical records indicate that most of the expansion area was agricultural as recently as two decades ago (DOE 1992a). Since then the site has been allowed to revegetate, and currently it is a low to moderate quality forest. The mixed deciduous forest contains an invasive species (Chinese tallowtree) and the area has been disturbed from activities occurring at the current SPR storage facility and adjacent industrial facilities. Hurricanes Rita and Katrina in the fall of 2005 caused no long-term effects to the biological resources in the expansion area.

The forested areas are characterized by dense forest with patches of scrub-shrub vegetation. Canopy species include live oak, Chinese tallowtree, sweet gum, and box elder. Some live oak trees present at the site are greater than 2.5 feet (0.8 meters) in diameter and are estimated to be about 150 years old. The forest understory vegetation is dense and comprised mainly of tree saplings, blackberry, greenbriar, and Virginia creeper. The proposed expansion site boundaries encompass no large surface water bodies; however, the site does contain two intermittent streams and two small ponds. Palustrine wetlands—which comprise approximately 15 acres (6.1 hectares), or 11 percent, of the proposed expansion area—are associated with the ponds and intermittent streams.

Wildlife species inhabiting the area are common to disturbed areas along the Texas Gulf Coast. These species include white-tailed deer, nine-banded armadillo, pocket gopher, coyote, and quail. The aquatic systems onsite are not large or stable enough to support fish populations; however, they could provide habitat for invertebrates, small reptiles, and amphibians.

The area surrounding the expansion site is developed and managed mostly for agriculture and some industrial facilities. Agricultural fields and oil fields border the proposed expansion site. These areas provide habitat similar to the disturbed portion of the proposed expansion site.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the Big Hill storage facility is located: piping plover, and several marine mammals and sea turtles. However, a review of the conditions at Big Hill and consultations with USFWS and the Texas Parks and Wildlife Department revealed that the expansion area does not provide suitable habitat for and would not

affect any federally listed threatened or endangered species, species proposed for listing, or candidate species (see appendix H).

Species that occur in Jefferson County, which would contain the proposed Big Hill expansion site, that are listed as threatened or endangered by the State of Texas but that are not on federal lists are identified in appendix I. Based on a comparison of the habitat preference of these species and the habitat present at the site, the species listed in table 3.7.10-1 may use the habitat at the expansion site.

Table 3.7.10-1: Species on State Lists of Threatened and Endangered Species With Potentially Suitable Habitat at the Proposed Big Hill Expansion Site

Common Name	State Status	Global Status ^a	Potentially Suitable Habitat at Site
Bachman's sparrow	Threatened	Vulnerable (G3)	Secondary succession forest with live oak trees
Swallow-tailed kite	Threatened	Secure (G5)	Tall, easily accessible trees and open areas for foraging
White-faced ibis	Threatened	Secure (G5)	Palustrine wetlands
Wood stork	Threatened	Apparently secure (G4)	Palustrine wetlands
Black bear	Threatened	Secure (G5)	Hardwood forest with thick understory
Rafinesque's big-eared bat	Threatened	Vulnerable (G3)	Hardwood forest, particularly trees with loose bark and hollows
Scarlet snake	Threatened	Secure (G5)	Hardwood, pine, or mixed forest and woodland habitat

Notes:

^a Secure is defined by NatureServe and the Texas Natural Diversity database as common, widespread, and abundant. Apparently secure is defined as uncommon, but not rare. Vulnerable is defined as at moderate risk of extinction due to range restrictions and relatively few populations (80 or fewer).

Source: NatureServe 2005

None of these species is known to occur on the site; however, surveys or habitat assessments have not been completed.

Special Status Areas

The proposed Big Hill expansion site contains no special status areas. Special status areas in Jefferson County near the site include the McFadden National Wildlife Refuge, 5.6 miles (9 kilometers) away; Sea Rim State Park, 8.1 miles (13 kilometers) away; and the Anahuac National Wildlife Refuge, 12 miles (20 kilometers) away. No recorded bird rookeries are located within 1 mile (1.6 kilometers) of the Big Hill expansion site.

3.7.10.1.2 Big Hill Rights-of-Way

Under the proposed expansion, construction would occur within the following two pipeline ROWs:

- A proposed crude-oil pipeline adjacent to an existing ROW for 23 miles (37 kilometers) from the site to the Sun Terminal in Nederland, TX; and
- Replacement of the first 1.3 miles (2.1 kilometers) of the existing brine disposal pipeline leaving the Big Hill site.

Plants, Wetlands, and Wildlife

The crude oil pipeline and the brine pipeline ROWs are existing and maintained corridors, with approximately 79 percent of the ROWs containing disturbed or managed habitat (urban, agricultural, and industrial land uses), which include some wetlands. The vegetation within both pipeline ROWs is herbaceous species with some shrubs along the edges in forested areas. Approximately 32 percent of the ROW consists of palustrine emergent wetlands, about 3 percent consists of lacustrine wetlands. Palustrine forested, palustrine scrub-shrub, palustrine unconsolidated bottom, and riverine wetlands each consists of 1 percent or less of the ROWs.

Based on the land classification types and the types of wetlands along the crude oil ROW, several common mammals, birds, amphibians, and reptiles might use the existing habitats in the ROW. The habitat is disturbed and therefore of low to moderate quality. The wildlife types would be similar to those found at the proposed Big Hill expansion site.

The small aquatic habitats along the proposed ROW consist of bayous or gullies. These systems receive some tidal influence, causing the water to be slightly brackish at times. The streams and gullies crossed by the proposed ROW do not support submerged aquatic vegetation. Typical fresh-water riverine species common throughout the Gulf Coast region can be found along the proposed ROW stream crossings.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the proposed Big Hill ROWs would be located: piping plover, and several marine mammals and sea turtles. However, a review of the conditions along the pipeline ROWs and consultations with USFWS and the Texas Parks and Wildlife Department revealed that the ROWs do not provide suitable habitat for any federally listed threatened or endangered species, species proposed for listing, or candidate species (see appendix H).

Appendix I identifies species in Jefferson County that are listed as threatened or endangered by the State of Texas, but that are not on federal lists. Table 3.7.10-2 lists the results of a comparison of species-specific habitat preferences and the potential habitat present along the pipeline ROWs for threatened or endangered species on state lists.

There are no known occurrences of these species within the proposed ROW, although no comprehensive survey or habitat assessment has been completed.

Special Status Areas

The J.D. Murphee Wildlife Management Area is a diverse coastal wetland community located within 0.25 miles (0.4 kilometers) of the existing pipeline ROW to Nederland, TX (see figure 2.5.2-1). The 24,000-acre (9,800-hectare) area is in the prairie-marsh zone of the upper coast of Texas, and it supports wetland communities that range from fresh-water to saline (TPWD 2006). The area is an important nesting site for mottled ducks, blue-winged teal, and snow geese. The area also provides habitat for alligators, muskrat, coyote, river otter, armadillo, bobcat, and nutria.

The portion of the brine pipeline that would be replaced is located approximately 4 miles (6 kilometers) north of the McFadden National Wildlife Refuge.

One cattle egret rookery has been documented approximately 0.7 miles (1.1 kilometers) north of the proposed crude oil pipeline ROW.

Table 3.7.10-2: Threatened Species on State Lists Compared With Potentially Suitable Habitat Along Big Hill ROWs

Common Name	State Status	Global Status ^a	Potentially Suitable Habitat at Site
Bachman's sparrow	Threatened	Vulnerable (G3)	Herbaceous vegetation, shrubs, and forested areas
Reddish egret	Threatened	Apparently secure (G4)	Bayous and wetlands
Swallow-tailed kite	Threatened	Secure (G5)	Tall, easily accessible trees and open areas for foraging
White-faced ibis	Threatened	Secure (G5)	Bayous and palustrine wetlands
Wood stork	Threatened	Apparently secure (G4)	Bayous, wetlands, and brackish wetlands
Rafinesque's big-eared bat	Threatened	Vulnerable (G3)	Hardwood forest, particularly trees with loose bark and hollows
Scarlet snake	Threatened	Secure (G5)	Hardwood, pine, or mixed forest and woodland habitat

Notes:

^a Secure is defined by NatureServe and the Texas Natural Diversity Database as common, widespread, and abundant. Apparently secure is defined as uncommon, but not rare. Vulnerable is defined as at moderate risk of extinction due to range restrictions and relatively few populations (80 or fewer).

3.7.10.2 Impacts

3.7.10.2.1 Big Hill Expansion Storage Site

Plants, Wetlands, and Wildlife

The clearing, grading, and filling associated with the proposed Big Hill expansion area would affect the entire 210-acre (83-hectare) site. The construction would affect the following resources:

- 180 acres (73 hectares) of previously disturbed habitat, including a small number of large live oaks and wetlands,
- 8 acres (3 hectares) of hardwood forest,
- 8 acres (3 hectares) of bare soil, and
- 10 acres (4 hectares) of evergreen (pine) forest.

Clearing and grading the mixed evergreen and deciduous forest would affect the previously disturbed plant communities. The disturbance would not affect a regionally unique habitat. These impacts are described in section 3.7.1.2 (Common Impacts). Similar transitional forest is available in abandoned agricultural areas surrounding the proposed Big Hill expansion site.

DOE would fill about 15 acres (6 hectares) of palustrine forested and emergent wetlands. Similar wetland habitat occurs in the surrounding area. DOE would complete a wetland delineation and secure a jurisdictional determination from USACE. In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and would preserve onsite emergent wetlands to the maximum extent practicable. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the mitigation measures described in the Common Impacts section (section 3.7. 2) and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and Texas Commission on Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

Construction of the proposed expansion site would affect the intermittent streams there because the site would be cleared and graded. Runoff associated with clearing and grading would impact water quality temporarily. The intermittent stream could be channelized, altering the aquatic habitat available for amphibians, invertebrates, and small reptiles. If possible, DOE would avoid filling in the two small ponds in the expansion area.

As described in section 2.3, DOE would minimize erosion by using best management practices. An erosion- and sediment-control plan and TPDES stormwater permit issued by Texas Commission on Environmental Quality for construction activities would be secured, which would require use of best management practices that minimize the impact to water bodies.

The habitats present in the proposed Big Hill expansion site have been disturbed previously, and they are not regionally unique habitats. As discussed in section 3.7.2, during construction some wildlife species would be killed or displaced to similar habitat surrounding the proposed expansion site. Though these impacts may affect individual organisms, the construction, operations, and maintenance of the facility would not alter the regional population or species' viability.

The general operations and maintenance of the storage site, including grounds maintenance, lighting, noise, and vehicular traffic in and around the facility, would be similar to activities already taking place at the SPR facility and at other nearby operations. The most common wildlife in the vicinity of the SPR facility already have adjusted to these activities, and they likely would not be disturbed as a result of operations and maintenance at the proposed expansion site. Fencing would exclude large mammals and removing trees would remove bird nesting sites, although some mobile species and birds would probably still visit the site.

Potential operational and maintenance impacts on migratory birds, such as artificial lighting hindering migration, are described in section 3.7.2.

Mitigation: DOE, in cooperation with USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. DOE would use down-shielding and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife. If this candidate alternative is selected, DOE would conduct a survey of raptor nests and secure any necessary permits in accordance with requirements of the Migratory Bird Treaty Act.

Mitigation: DOE would implement a plan to control the Chinese tallowtree invasion on the site. DOE would control invasive species by using seed mixes devoid of exotic and invasive species and through postconstruction monitoring of the disturbed areas. If the monitoring detected problems with invasive species, DOE would implement corrective action. DOE would continue to refine the conceptual site plan to avoid and minimize impacts to wetlands to the extent practicable.

Special Status Species

The proposed Big Hill expansion site would not affect any federally listed threatened or endangered species, species proposed for listing, candidate species, or designated critical habitat (see appendix H).

Given the disturbed nature of the site and the surrounding industrial activity, it is unlikely the site supports any state-listed species. However, construction activities would permanently remove an area that may be suitable habitat for several species that are listed as threatened by Texas. Populations of

Bachman's sparrow, swallow-tailed kite, white ibis, and wood stork that may use the habitat located at the storage site could find similar areas of potential habitat adjacent to or near the site. Potentially displaced populations of scarlet snake and Rafinesque's big-eared bat could find suitable habitat near the proposed Big Hill expansion site. If this alternative is selected, DOE would conduct a survey or habitat screening for these species and secure a permit from Texas Parks and Wildlife Department for any unavoidable taking of a state-listed species.

The operations and maintenance of the site, including grounds maintenance, lighting, noise, and vehicular traffic in and around the facility, would be similar to activities already taking place at the SPR facility and at other operations in the region. Therefore, there would be no notable change from the existing conditions and no impact to special status species (if any are present).

Special Status Areas

No special status areas would be affected by the construction or operation of the proposed Big Hill expansion site.

3.7.10.2.2 Big Hill Rights-of-Ways

Plants, Wetlands, and Wildlife

During construction of the proposed crude oil pipeline, the existing ROW would be expanded and the existing vegetation would be cleared. Refurbishment of the brine disposal pipeline would also require the clearing of vegetation. The construction ROW would affect the following:

- 232 acres (94 hectares) of disturbed or managed habitat,
- 48 acres (19 hectares) of evergreen (pine) forest,
- 3 acres (1 hectare) of sand bar and beach,
- 3 acres (1 hectare) of grassland and scrub-shrub habitat, and
- 1 acre (0.4 hectares) of hardwood forest.

Using the USFWS' National Wetlands Inventory maps and estimated construction footprint, the ROWs would affect the following wetlands:

- 143 acres (58 hectares) of palustrine emergent wetlands,
- 12 acres (5 hectares) of lacustrine wetlands,
- 5 acres (2 hectares) of palustrine scrub-shrub wetlands,
- 5 acres (2 hectares) of palustrine unconsolidated bottom wetlands,
- 3 acres (1 hectare) of palustrine forested wetlands,
- 3 acres (1 hectare) of riverine wetlands, and
- 1 acre (.4 hectares) of other wetlands.

Because the Texas Gap Analysis Program data use different habitat classification categories than the National Wetlands Inventory data, some of the wetland acreage is captured under other land categories (e.g., disturbed or managed habitat and scrub-shrub habitat).

The entire ROW corridor follows existing pipeline corridors that already contain fragmented and disturbed plant communities. Approximately 79 percent of the existing pipeline corridor passes through disturbed or managed habitat that includes agricultural lands and industrial areas. The proposed pipeline/power line corridors would permanently affect about 33 to 40 percent of the acreage described because only a 50-foot (15.2-meter) wide easement per pipeline would be permanently maintained. The

vegetation within the construction easement would be cleared, but DOE would regrade to pre-construction contours and reseed with native species within this area to re-establish native habitat. The area within the permanent easement would be permanently maintained, but some wetland functions would be restored because the area would be regraded to preconstruction conditions and allowed to regenerate to emergent wetlands. Appendix B provides detailed information about the types of wetlands, and the nature and amount of wetland impact from the permanent and construction easements. In addition, many of these wetlands would be avoided by directional drilling from the adjacent uplands.

DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in accordance with the Section 404/401 permit conditions, which would compensate for the jurisdictional wetlands that were affected.

The crude oil pipeline to Nederland, TX would be constructed adjacent to existing ROWs and the timeframe for construction at any point on the pipeline would be no more than 6 to 10 weeks. The species using the existing ROWs are tolerant of disturbances, and they would be displaced temporarily to suitable adjacent habitat.

Refurbishment of the brine disposal pipeline would take place within the existing pipeline corridor. Construction related to removing and replacing the pipeline would temporarily disturb vegetation and displace wildlife in and near the pipeline ROW. This corridor has already been disturbed, is low to moderate quality for wildlife habitat, and would not affect the regional population or overall species viability.

Section 3.7.2 discusses operations and maintenance activities such as mowing, pipeline inspections, and stump removal. These activities would be similar to activities already occurring in the existing ROWs. Common wildlife in the vicinity of the pipelines already have adapted to these operations and maintenance activities. These organisms likely would not change their behavior as a result of the expanded ROWs. The construction, operations, and maintenance impacts may disrupt individual organisms, but would not alter the regional population or species viability.

Mitigation: As presented in chapter 2, DOE would minimize the footprint of the maintained easement, limit the use of trenching across small water bodies, and use directional drilling under larger water bodies (greater than 100 feet [30 meters]) or in areas containing sensitive habitat. DOE would reseed disturbed areas with native species to promote re-establishment of the impacted plant community. DOE would conduct postconstruction monitoring of the construction easements to identify problems with erosion, invasive species, or hydrologic changes. DOE would correct problems that are identified.

Special Status Species

The proposed expansion and operations and maintenance of the ROWs would not affect any federally listed threatened or endangered species, species proposed for listing, candidate species or designated critical habitat (see appendix H).

Construction activities along the ROWs temporarily would alter the palustrine emergent wetland habitat and remove small portions of forested habitat that might be used by species listed by Texas as threatened or endangered. Construction time would be short, between 6 to 8 weeks, along any portion of the ROW. An abundance of suitable habitat would be available adjacent to the affected areas. The 2.9 acres (1.2 hectares) of forested areas that would be converted along the ROWs could potentially be used by Rafinesque's big-eared bat and scarlet snake. The construction, operations, and maintenance impacts may

disrupt individual organisms, but would not alter the regional population or species viability. If this alternative is selected, DOE would conduct a survey or habitat screening for these species and secure a permit from the TPWD for any unavoidable taking of a state-listed species.

Special Status Areas

No special status areas would be affected during construction or due to operations and maintenance. The construction corridor would expand only a short distance outside of the existing pipeline ROW, and it would not overlap with the J.D. Murphee Wildlife Management area or rookeries. At the nearest point, it would be located 0.25 mile (0.4 kilometers) from the management area and 0.7 mile (1.1 kilometers) from a rookery.

3.7.11 West Hackberry Expansion Site

This section addresses the following areas:

- The acquisition of three existing caverns and the development of a new access road, installation of security fencing, and creation of security buffer area around the expansion site.

The West Hackberry storage site has most of the infrastructure in place for the operation of additional caverns. Expansion would require only minor upgrades to the RWI, crude oil distribution system, and the brine disposal system, as described in section 2.5.3. The activities listed above would connect the acquired caverns into the SPR storage site. Because the facility upgrades to the RWI structure, crude oil distribution system, and the brine disposal system would not increase the facility footprint or significantly change the current operation, these systems are not analyzed in this section.

3.7.11.1 Affected Environment

3.7.11.1.1 West Hackberry Expansion Storage Site

Plants, Wetlands, and Wildlife

The West Hackberry storage facility is located in Cameron Parish. The existing storage site covers approximately 570 acres (230 hectares) on the West Hackberry salt dome. To expand the West Hackberry SPR site, DOE would purchase 3 existing caverns and 240 acres (97 hectares) of land. DOE would only expand the facility fence line around approximately 53 acres (21 hectares) of the site that contains the existing caverns. This area consists of previously disturbed habitat. An additional 27 acres (11 hectares) of vegetation surrounding the cavern area would be cleared of woody vegetation for a 300-foot (91-meter) security buffer.

The region where the West Hackberry storage facility is located contains numerous canals and natural waterways that bisect the landscape. This region consists of forested and emergent wetlands with natural ridges. These ridges typically support upland forested and herbaceous communities and affect water flow through the marshes (emergent wetlands). In many areas, lakes, bayous, and canals are densely packed so that the marsh may not seem to be a landmass, but rather a large region of small islands. The West Hackberry site was affected by recent hurricanes, but the plant communities were not significantly affected.

There are extensive emergent wetlands and open water areas surrounding the proposed West Hackberry expansion site. The purchased land area and the storage facility are adjacent to Black Lake. Many bird species frequent the area. Other inhabitants include common organisms such as red fox, raccoon, nutria,

opossum, and white-tailed deer. The American alligator is common in this area. The emergent wetlands also support a variety of other reptiles, fish, shellfish, and mammals.

Special Status Species

A literature review indicated that the following federally listed species may be present within the county where the West Hackberry storage site is located: bald eagle, brown pelican, piping plover, gulf sturgeon, red wolf, and several marine mammals and sea turtles. However, a review of the conditions at West Hackberry and consultations with the USFWS and the Louisiana Department of Fisheries and Wildlife revealed that the portion of the expansion area that would be disturbed does not provide suitable habitat for any federally or state-listed threatened or endangered species, species proposed for listing, or candidate species (see appendices F and I).

Essential Fish Habitat

There is no EFH within or near the proposed West Hackberry expansion site.

Special Status Areas

The Sabine National Wildlife Refuge is located about 7.0 miles (11 kilometers) south of Hackberry, LA. This refuge consists of a wide range of habitats including fresh-water impoundments, bayous, ponds, lakes, wooded islands, and manmade canals and levees. The American alligator, red-eared slider turtle, mud turtle, and garter snake are found at the refuge and 250 species of birds visit the refuge during the year. The Sabine National Wildlife Refuge also supports mammals such as the otter, mink, muskrat, mink, raccoon, and opossum. No other federal or state special status areas are located near the West Hackberry site.

3.7.11.2 Impacts

3.7.11.2.1 West Hackberry Expansion Storage Site

Plants, Wetlands and Wildlife

The proposed expansion of the facility would affect the following:

- 53 acres (21 hectares) of disturbed or managed land,
- 19 acres (8 hectares) of grassland and scrub/shrub habitat,
- 5 acres (2 hectares) of emergent wetlands and water, and
- 3 acres (1 hectare) of other land classification categories.

Clearing and grading the grassland and managed fields would affect the previously disturbed plant communities. The disturbance would not affect a regionally unique habitat. These impacts are described in section 3.7.1.2 (Impacts Common to Multiple Sites).

The USFWS National Wetlands Inventory maps identified 5 acres (2 hectares) of palustrine scrub-shrub wetlands that would be cleared for the expansion of the site security buffer. DOE would complete a wetland delineation and secure a jurisdictional determination from USACE (USFWS 2006b). In addition, DOE would refine the conceptual site plan to avoid filling in jurisdictional wetlands and would preserve onsite emergent wetlands to the maximum extent practicable. DOE would submit a permit application under Section 404/401 of the CWA, which would require a comprehensive analysis of the steps taken to avoid, minimize, and compensate for impacts to jurisdictional wetlands. DOE would implement the

compensation measures described in the Common Impacts (section 3.7.2) and in accordance with the 404 permit and 401 Water Quality Certificate from USACE and the Louisiana Department of Environmental Quality. Specifically, DOE would preserve, restore, or create wetlands or contribute to a mitigation bank in the region in accordance with the permit to compensate for the jurisdictional wetland impacts.

After the security fencing is constructed, wildlife use of the site would be limited. Some mobile species and birds would probably still visit the site. Noise from construction would be temporary.

The impacts of operations and maintenance activities for SPR facilities, such as increased noise, human disturbance, traffic, and light pollution, are described in the Common Impacts (section 3.7.2). Locally, the operations and maintenance activities associated with the proposed West Hackberry expansion would be comparable to existing activities. The plant communities associated with the proposed expansion have been previously disturbed and are adjacent to an active facility. The wildlife has already adapted to the disturbed areas and the ongoing operations and maintenance activities and would not likely be affected as a result of expansion site operations and maintenance.

Mitigation: DOE, in cooperation with the USFWS, would mitigate impacts on migratory birds that frequent the facilities during the year. DOE would conduct a survey of raptor nests and secure any necessary permits in accordance with the requirements of the Migratory Bird Treaty Act. DOE would use down-shielding and low-mast lights to minimize the impacts of artificial lighting on migratory birds and other wildlife.

Mitigation: DOE would continue to refine the facility footprint to avoid and minimize wetland impacts.

Special Status Species

A review of the conditions at West Hackberry and consultations with the USFWS and the Louisiana Department of Fisheries and Wildlife revealed that the portion of the expansion area that would be disturbed does not provide suitable habitat for any federally or state-listed threatened or endangered species, species proposed for listing, or candidate species (see appendices F and I).

Essential Fish Habitat

There is no EFH within or near the proposed West Hackberry expansion site.

Special Status Areas

Expansion of the West Hackberry site would have no impacts on special status areas. The nearest protected area, the Sabine National Wildlife Refuge, is located approximately 7 miles (11 kilometers) south of the site and is too distant to be affected by construction or operations and maintenance activities.

3.7.12 No-Action Alternative

The no-action alternative would limit the impacts from SPR construction and operation to those that have already occurred or that will occur at the existing SPR storage sites at Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry. The existing environments for the proposed new SPR storage site alternatives would be maintained. The Bruinsburg storage site would likely remain in agricultural use because of the lack of development pressure. The Chacahoula storage site could remain undeveloped. However, existing oil and gas activities occur near the Chacahoula storage site and if the proposed site could be developed by a commercial entity for oil and gas purposes some spill risk to biological resources

could exist. The Richton site would likely remain in use as a pine plantation because of the lack of development pressure. Dow, British Petroleum, Conoco, and Occidental energy companies have storage facilities on the Stratton Ridge dome and it is possible that the Stratton Ridge storage site could be developed for cavern storage by a commercial entity, which could involve brine spill risk to biological resources. The onshore Clovelly Dome Storage system would continue to operate unchanged as a component of LOOP with the exception of any expansion that LOOP might undertake.

For the portions of the proposed storage site pipelines that follow existing ROWs there would be some risk of a spill and consequent impact on biological resources. The risk of a spill associated with the no-action alternative would be limited to that which exists from the existing pipelines. For the portions of the pipeline in new ROWs the no-action alternative would not present any spill risk to biological resources. For the sites of terminals that are in developed petroleum storage areas it is possible that a commercial entity could develop them for storage and some spill risk to biological resources could occur.

No additional potential impacts to plants, wetlands, wildlife, threatened and endangered species, marine habits, and protected species would be related to the selection of the no-action alternative.